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A merchant of Toledo said recently that a troublesome congestion of freight in that city, inconveniencing receivers of all kinds of car-load goods, was due to bad management, and that in St. Louis a similar overcrowding of railway facilities did not cause delays. What degree of truth there may be in this accusation as regards Toledo we do not know; but from St. Louis we are informed that such virtues as there may be in the plans and methods of handling freight in that city are due to the simple fact that the men who manage the business are constantly "on the job." The situation is described in an article in another column—which, however, is written in general terms, making no reference to St. Louis. The men who switch and deliver cars make that their main business; the highest officers give this business their chief attention, and the company is alert to know and, we suppose, to meet, all reasonable demands for additions or improvements to the plant. In short, it is an illustration of the old principle that to make sure of the accomplishment of a severe and complicated task, some strong man must make that task his chief concern. Another old principle comes to notice: The principle that valuable things must be paid for. Every wideawake business man who pays for any service more than his competitor pays will sooner or

later be found trying to beat down the price; and to-day we see in St. Louis a committee of shippers and wholesalers declaring in strenuous language that their constituents ought to deal with the railways individually and not with the Terminal Railway Association—which, though it is a separate corporation and really a railway in itself, represents the large lines, being owned by them. These merchants say that the charges of the Terminal are too high. Whether this is actually so, or is true only in the sense that all railway charges are too high, when viewed from the shipper's standpoint, remains to be seen. Unfortunately, the value of promptness and efficiency in freight service is not easily measured, and the railways' customers are therefore usually unwilling to pay for these qualities, whereas delays and losses may be expressed in dollars and cents with lightning-like rapidity.

Many of the endorsements given to President Taft's plan for a court of commerce when it was first suggested, including that of the *Railway Age Gazette*, were based on the assumption that the tenure of the members would be for life. The administration's bill, which is pending in both houses of Congress, provides otherwise. Under it the Chief Justice of the United States would designate five circuit judges to serve on the court for not more than five years. After 1914 no circuit judge could be re-designated to serve until at least one year after the expiration of the period of his last previous designation. This arrangement nullifies the main arguments advanced in favor of the creation of a court of commerce. One of these was that its members, by long experience, would get special knowledge of railway law and railway affairs, and thereby special fitness to deal with the technical, but vitally important, questions involved in litigation over the rights of carriers, shippers and public. But a court constituted as the administration's bill proposes would have little more technical fitness to try such cases than any circuit court. It would take four or five years for a judge to get the knowledge and experience necessary to peculiarly fit him for his duties, and just as he got them he would be sent back to his circuit. A court whose members were appointed for life might in time exceed in knowledge of railway affairs even the Interstate Commerce Commission. A court constituted according to the administration's plan never would have as much knowledge of railway affairs as the commission, because members of the commission are appointed for ten years and often are re-appointed. The railways doubt the impartiality of the commission. They would rely on the impartiality of a court of commerce, but they have confidence now in the impartiality of the circuit courts. It has been said that the decisions of a court of commerce would be more consistent than those of the various circuit courts. But a court whose personnel was constantly changing, and would be entirely changed every five years, would not necessarily be more consistent in its decisions than the existing courts. We believe the view that the judges of the court of commerce should be appointed for life is held by almost everyone having any technical knowledge of railway affairs. It is the view of the Interstate Commerce Commission as expressed by Chairman Knapp on behalf of that body at the hearing before the Senate committee on interstate commerce on February 17. It is the view also expressed by E. B. Peirce, general solicitor of the Rock Island, in his statement before the House committee on interstate and foreign commerce on February 10. As an expression from the railway standpoint, Mr. Peirce's statement has peculiar weight, because, as commerce counsel of the Rock Island-Frisco lines, he probably has appeared in more proceedings under the Hepburn act than any other lawyer. If the administration and Congress are not disposed to create a court of commerce which will be fit to serve some useful purpose it would seem they had better spare the country the expense of maintaining one.

THE GRAND TRUNK'S INVASION OF NEW ENGLAND

It may be set down as well-nigh an axiom of railway development that any extensive absorption of productive territory by a railway system is sure to be followed by an incursion of a rival. Stated more briefly, profitable monopoly challenges competition. The time and nature of the competition and the direction from which it may come varies infinitely. But it is pretty sure to come from somewhere, or at least, be threatened. The New England situation is the latest illustration of the principle. Not long ago the New York, New Haven & Hartford, by securing control of the Boston & Maine, joined southern and northern New England and six states with high productive power in first-class freight business, and with high passenger density, in a single monopoly. But hardly is it consummated when the Grand Trunk applies to the Rhode Island legislature for a kind of "omnibus" charter for a line to Providence. The Grand Trunk proposes to build from its Central Vermont line at Palmer, Mass. The proposed charter, as often in such cases, asks for more than the applicant expects to get. It seeks not only powers of local extension in Rhode Island but special privileges in the use of the New Haven's great plant in that state.

The story of the immediate facts leading up to the situation is, in some respects, more interesting than the situation itself. In the late months of the year 1908 the New Haven made what was, in effect, a traffic alliance with the Canadian Pacific by which all-rail business from New York city to the west was secured at rates competitive with the Grand Trunk, which takes freight by boat and rail via New London and at a much lower rate than that of the standard trunk lines. The alliance was, in practice, only effective during the "closed" months of the lower lake and rail rate. But it got New York business on a considerable scale and shook up seriously the whole west-bound rate status. The usual "conferences" of presidents followed. But the stress of a threatened trunk line rate war did not relax until recently, when, under the threat of reductions by the Erie and the Lackawanna, the New Haven receded to avoid the prospective war, and not only yielded its Canadian Pacific alliance but raised its rates over the Ontario & Western to the basis of 75 cents, that of the standard lines. The Grand Trunk, however, yielded nothing to the demands of the Erie and Lackawanna, though it was included in them. It saw the menace to its New England business by the friendly relations of the New Haven with the Canadian Pacific, and a menace not diminished by the New Haven's control of the Boston & Maine. Accordingly, the Grand Trunk seems to have elected an aggressive policy. Its first step was the substitution last July of its own boats for those of the New Haven between New York and New London. Its second step is the application for the Rhode Island charter of the Palmer-Providence extension. According to a statement by Vice-President Buckland the New Haven will, in deference to Rhode Island business sentiment, not oppose an ordinary charter, but confine itself to resisting one granting special privilege. Mr. Buckland says: "If the proposed charter to be granted to the Southern New England Railway Company is the bona fide desire on the part of a reputable, solvent corporation to enter Rhode Island it would be useless and foolish for me to attempt to stop it, for it would be obviously for the interests of the state of Rhode Island."

Such is the contest as it appears behind the scenes. In the background there are unseen forces and factors of greater moment. The prime ambition of the Grand Trunk for years has been to obtain by traffic agreement a New York terminal for through all-rail business, and the New York, Ontario & Western has been of late its chief objective. A year or more ago during the trunk line conferences then in progress there was a credible report that the Grand Trunk offered the New Haven the surrender of its southern New England rail connection in return for a similar concession involving the

Ontario & Western. The Rhode Island charter, with its potentialities, thus appears in a fresh light. It can be used actually to build a new competing route or as a "big stick" to secure concessions, or for both. And if coupled with a Providence-New York boat line it becomes a new, not to say disturbing, element in the trunk line business. There are modifying facts. A year or two at least must elapse before the new line can be built. It must be a line of the "long bridge" type, not of ramified branches and extensive local business. But even as a project it complicates a situation not limited to New England. It will be interesting to observe whether hereafter, with a charter granted, that charter is used concretely for a new line or as a club to extort concessions.

There is another and more general aspect: Canada has now two large and rival railway systems—the Canadian Pacific and the Grand Trunk. The first is stalwart financially, the second, relatively speaking weak, but with that paradoxical strength acquired by relief from the obligation to pay good dividends. New England is to be one of their immediate battlegrounds, with ultimates at New York city. The New Haven system, intrenched for the time being in its territorial monopoly of the six New England states, is now suddenly called upon not merely to readjust itself between the two rivals, but to serve as a kind of "buffer" between them and the main trunk lines. The outcome hereafter, as the Canadian rivals push downward either for new business of their own or for stripplings of existing business, will be worth watching.

ENGINE AND TRAIN RESISTANCE.

Calculations relating to engine and train resistance have always been uncertain and unsatisfactory because the conditions affecting the various resistances which go to make up the total load to be overcome are never exactly alike in any two trains and are apt to vary considerably even when the size and weight of the trains are the same. Owing to this reason, and to many other disturbing causes, every investigator of the subject has found something different from those who preceded him, and has proposed new formulas and factors which he believes to be more nearly correct. Dr. Sinclair has been honored with a curve of train resistance which bears his name in the text books and locomotive pamphlets. On both sides of it, and crossing and recrossing it, will be found other lines representing the law of train resistance as affected by speed as calculated by A. M. Wellington, D. L. Barnes, A. F. Aspinall, the Baldwin Locomotive Works and the American Locomotive Company. Making a necessary choice among these curves for a factor in tonnage rating would seem to be less like a matter of science than of religion or politics. One is selected, not on its intrinsic merits, but, perhaps, because of a more or less intimate acquaintance by the one making the selection with the author.

With the improvements in dynamometer cars more accurate measurements have been made, and in getting figures for tonnage rating a large amount of data on the resistance of modern 50-ton steel cars has been accumulated. Dynamometer records from heavy passenger equipment at high speeds have also been collected, a number of new papers have been written which include theoretical treatment of the subject, and there is now opportunity for a study of the problem which will narrow the uncertainties and make possible a more accurate predetermination of train resistance. Such a study was made by F. J. Cole, consulting engineer of the American Locomotive Company, and the principal part of it published in the *Railway Age Gazette*, commencing Aug. 27, 1909, page 361, and continuing through six issues.

The same material, with the addition of conveniently arranged tables, has been used in the preparation of a Bulletin recently issued by the American Locomotive Company. In this pamphlet on "train resistance" the curves and tables are clear cut and plainly printed, and the whole subject is placed

in convenient form for ready application. It is without doubt the most satisfactory treatment of train resistance yet published, and the mechanical departments of railways will feel indebted to the American Locomotive Company for its enterprise in putting this material in such satisfactory shape.

One of the main improvements in the method of treating the subject is the more rational and intelligent consideration of engine and tender resistance. The internal locomotive resistance is assumed to be independent of speed, and a figure derived from the Pennsylvania Railroad St. Louis tests is used for calculating it. The weight on drivers in tons is multiplied by 22.2 for resistance in pounds due to the friction of driving wheels, piston rods, cross heads, etc. The resistance of engine trucks, trailing wheels and the tender is assumed to be the same as that of the cars in the train. The head air resistance of the engine is taken to be 120 sq. ft. $\times .002 V^2$. This factor is the one used by the General Electric Company, though it is not explained why it is preferred to the larger one, $.0027 V^2$, derived from the Berlin Zossen Electric Railway tests, where the observed pressures at very high speeds were measured on a car having a wedge or parabolic-shaped end, which should show less resistance than the rough and broken up surface of the front of a locomotive. It must be said, however, that the table giving data obtained from tests of high-speed passenger trains agrees closely with the results calculated by the use of this factor for one of the principal elements of resistance. The main departure from ordinary methods in calculating freight car resistance is the assumption that with slow-moving trains at the speeds ordinarily used in heavy freight service, the resistance may be regarded as constant between the limits of 5 and 30 miles per hour, that is, on level tangents at 30 miles per hour it does not exceed the resistance at 5 or 10 miles per hour.

The authority for this radical assumption is the fact that it is sustained by the regular tonnage ratings of several large railways, and no good and sufficient data has been found to contest it. The explanation is interesting and assumes that one or more of the elements which make up the total of train resistance have a maximum value at starting and reach a maximum at 20 or 30 miles per hour, with a slightly increasing value at higher speeds. Journal friction has this characteristic, as it is highest at starting and does not reach a minimum value until a considerable speed is attained.

The tables and diagrams in the pamphlet for freight car resistance do not take account of speed, more importance being placed on the weight of the cars and their lading in obtaining resistance in pounds per ton. While the change in journal friction may offset the increased air resistance due to speed in one class of cars, that change may be said to be normal for all journals of the same size, while the air resistance must be different for cars of different shapes, especially when empty, and it is still doubtful if a formula for empty freight car resistance can have general application to all speeds up to 30 miles per hour. Empty 50-ton hopper cars, box and stock cars must have a considerably greater end and side pressure at speeds of 20 to 30 miles per hour than at 5 or 10 miles per hour, and further investigation would show that the speed element must be considered for such conditions.

The effort to equate the tractive power of passenger locomotives and the resistance of passenger trains at speeds beyond 50 miles per hour is less satisfactory because locomotives of the same class seem to vary in their performance at high speeds, and there is a wide difference in the resistance of passenger cars of the same weight. Cars with 4-wheel trucks and cars with 6-wheel trucks must differ considerably in their resistance per ton. The curve and formula proposed for passenger car resistance is more complicated than that for freight cars, and it includes two variables which take account of velocity, one of them having V^2 and the other V^3 . This curve differs from that derived from the Pennsylvania Railroad dynamometer data by $1\frac{1}{2}$ lbs. per ton resistance at 50 miles per hour,

while at 75 miles per hour the lines are in close agreement.

A difference in the design and condition of the trucks and of the brake lever equipment will show different resistances for passenger cars on nearly every railway, and until some of these differences are eliminated no satisfactory data for passenger car resistance can be obtained. For this reason we are inclined to believe that the resistance curve proposed for passenger cars, especially at the higher speeds, will be subject to modification in the future.

The effort to keep the air brake connections in close adjustment so as to limit piston travel has had a good effect in improving the efficiency of the brakes and has reduced the time and length of stop, but sufficient care has not been given to the proportions of the lever arms in relation to the slack adjustment. The result is that in many cases the brake shoes are in contact with the wheels when the train is accelerating speed, and this additional resistance makes a heavy drag on the locomotive and has not been taken account of in measuring passenger train resistance. In a recent test it was shown by dynamometer car that with the short piston travel, which was considered normal and desirable, the resistance at speeds of 50 or 60 miles per hour was nearly double that found when the adjustment was such as to keep the brake shoes free from the wheels. This probably accounts in some measure for the high resistance of passenger trains and for the difficulty which is found in accelerating to high speeds when there is an opportunity for a fast run. It will also account in part for the discrepancies which are found in dynamometer data from tests in passenger service.

NEW YORK CENTRAL & HUDSON RIVER.

There are several reasons why the operations of the New York Central & Hudson River Railroad are of peculiar interest. The company has been among the first in this country to feel the extreme pressure for high class service and perfect appliances which has been so marked a feature of railway operation in Great Britain, and must some day spread over most of this country. The New York Central has also had an extremely difficult situation to deal with in its New York terminal, and, during years when the increase in its passenger travel has been enormous, it has been engaged in a very elaborate scheme of electrification. These difficulties in themselves make the annual report interesting; an additional feature of much interest and importance is the strongly departmental operating organization, which is unique among great American railway companies.

The theory of the New York Central organization is that the best technical skill and the best mechanical appliances available in the whole country shall be at the disposition of that part of the system which needs them most at any time. The division is subordinated to the system, and the division superintendent is almost without nominal authority, except his direct supervision over train movement. It has been expected that all departments would coordinate for the common good and, during the last two years, this expectation has to a large degree been realized, although for many years before that the departmental system and a rather apparent shortage of officers had produced disorganization rather than organization.

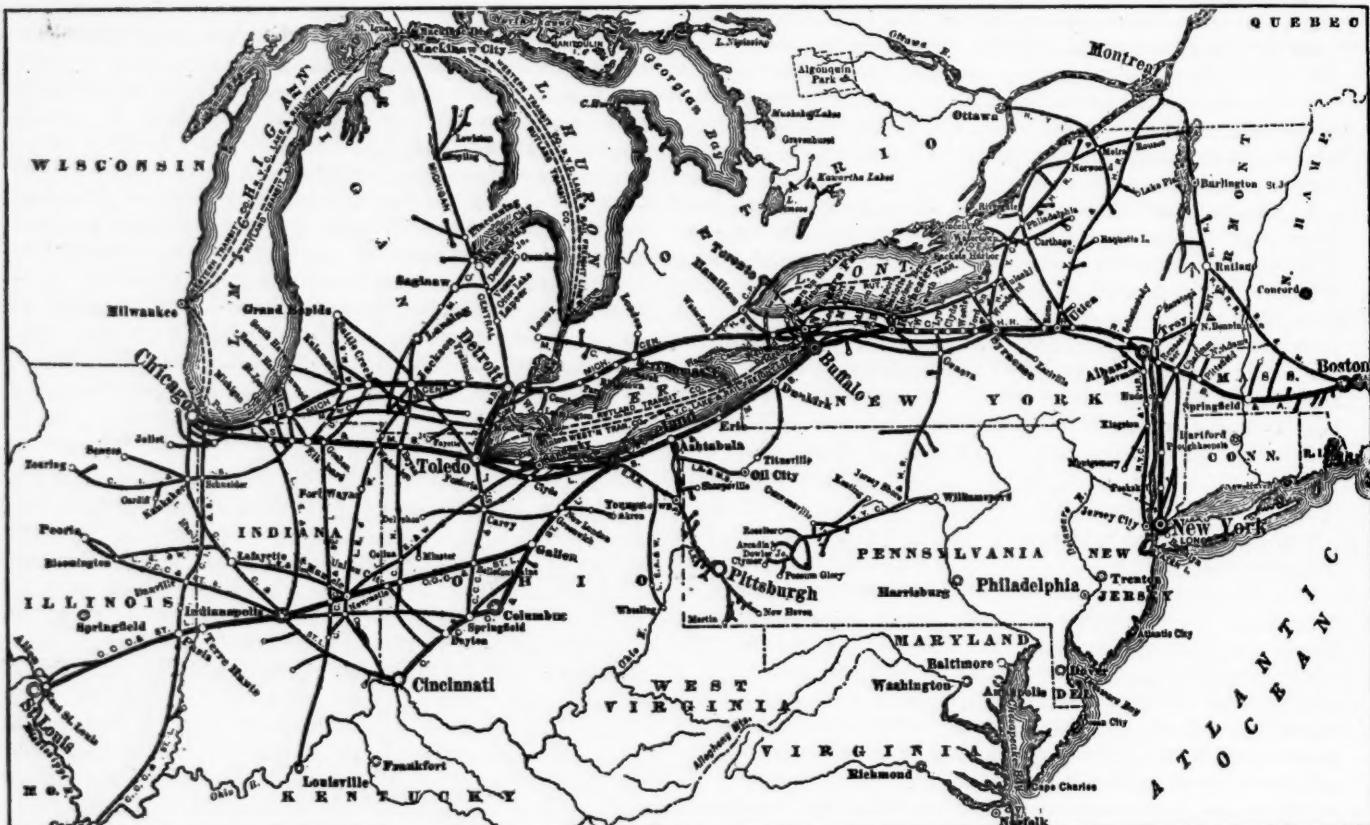
During the year ended December 31, 1909, the New York Central & Hudson River Railroad Company, operating 3,782 miles (of which 805 miles were owned, three miles were proprietary, 2,618 miles were leased and 356 miles were otherwise operated) earned \$93,171,861 gross from its rail operations, and operated for 69.33 cents of gross, leaving net revenue from rail operations of \$28,578,034. These results are in striking contrast to those of the 1907 year, when gross earnings were approximately the same, but the operating ratio was over 77 per cent.*

*Exact comparison with 1907 can scarcely be made, owing to the differences in the forms of accounting used.

The reduced operating costs this last year, as compared with those of 1907, were not obtained at the expense of the property. On identical mileage maintenance of way, structures and equipment cost \$26,915,671 in 1909 as against \$27,285,677 in 1907, while the cost of conducting transportation was reduced over twelve and a half millions in 1909 as compared with 1907.

This great gain in operating efficiency seems to be attributable to three main things: better yard and terminal facilities; better equipment, and better team play. Great congestion had been caused in 1906 and 1907 by the lack of proper facilities on some of the leased and allied lines, such as the Boston & Albany and the Rutland. Moreover, until 1908 the

between Forty-second and Forty-ninth streets, in New York City, is enormously valuable, and the company does not need its air rights in the conduct of the railway business. Consequently, it is making a beginning, jointly with the New York, New Haven & Hartford in erecting a large commercial structure occupying the entire block between Park avenue, Lexington avenue, Forty-sixth street and Forty-seventh street, and it is planned, if the experiment is successful, to build more of these office buildings. Ground rent is the determining factor in the success or failure of New York office buildings, if centrally located. The New York Central needs to pay no additional ground rent on account of these buildings, and it may well be supposed that they can add material-



The New York Central Lines.

The map shows, in addition to the roads whose reports are reviewed in this issue, the smaller New York Central Lines, like the Lake Erie & Western and the Rutland.

equipment had long been inadequate, and the roundhouse facilities had been insufficient to take care even of the existing motive power.

During the dull year of 1908 the company used great energy and farsightedness in remedying these defects. In that year it bought not far from 18 per cent. of all the locomotives actually built in the United States, and it got them at a price which averaged close to \$3,000 per locomotive below the prevailing figures for the same type of power at the present time; consequently, when the traffic became brisk again in 1909, the company found itself well equipped.

Since 1906 the New York Central has spent approximately \$42,500,000 on the work within the electric zone at New York, and the unexpended balance of authorizations and contracts stands now between 30 and 35 million dollars. The New York improvements are scheduled to be completed by the fall of 1912. These improvements include certain work of a character never before undertaken in this country. To provide for the work now being done at the New York terminal, the company acquired rather more area than that contained in three city blocks, in addition to its large holdings before this work was begun. This real estate, lying between Madison avenue on the West, and Lexington avenue on the East, and

ally to the income derived from this very costly tract of realty. The Hudson terminal buildings, erected in the interests of the Hudson & Manhattan Railroad, illustrate a situation somewhat similar, but the New York Central realty is much greater in extent.

The difficulties with the New York, New Haven & Hartford at one time threatened to become serious, but have now been adjusted, and the New Haven road is a long-term tenant of the New York terminal improvements, on a basis satisfactory to all concerned.

The cost of maintenance of way and structures per mile of single track is shown in the following table:*

	1909.	1908.
Maintenance way and structures per single-track mile.	\$1,615	\$1,539
Repairs and renewals: Per steam locomotive	2,188	2,101
" " " passenger car.....	639	620
" " " freight car	117	83

The company earned \$24,637 of operating revenue per mile of road; operating revenue per train mile was exactly \$2, and operating expenses per train-mile \$1.39. The average revenue trainload was 404 tons, as against 384 tons in 1908.

*According to the *Railway Age Gazette* formula, single track is derived by adding the entire mileage of first, second, third and fourth tracks, and one-half the mileage of sidings and yard tracks.

The amount received for each ton of freight was \$1.23, and the average ton-mile revenue was 6.31 mills. The average passenger-mile rate was 1.748 cents. The greatest changes in the details of freight movement were the large increases in bituminous coal, in cement, brick and lime and in manufactured articles. There were fairly large decreases in the tonnage of grain and of fruits and vegetables. Out of a total of 44,171,954 tons of freight moved in 1909, manufactures aggregated 12,441,114 tons, thus exceeding the bituminous coal movement of 11,404,560 tons. The effect of the depression in 1908 is well shown by the fact that the total tonnage of manufactured articles in that year was only 8,901,984 tons. How much more important this tonnage of manufactured articles is than the grain traffic, which used to be of such determining influence on the company's prosperity, is shown by the fact that grain tonnage in 1909 amounted to only about 4 per cent. of the total tonnage; whereas, even as recently as 1896, grain supplied over 12 per cent. of the total. The company's grain traffic has actually fallen off materially in the last 10 or 15 years, while its general traffic has gone ahead by leaps and bounds.

Viewing the whole group of eastern Vanderbilt lines together, it is noteworthy that the deplorable conditions which existed a few years ago on the Boston & Albany have now been remedied. That road is no longer in disfavor in the city of Boston; a comprehensive scheme of improvement work has been taken up, and proper roundhouse and terminal facilities have been provided for the large amounts of new equipment which have been purchased. The affairs of the Lake Shore, the Michigan Central and the Big Four lines are discussed elsewhere; it may be fairly said that the only real problem which confronts the management is that of the Rutland. The Rutland is a curious instance of a road handicapped in its development by the fact of having cumulative dividends on its stock. The unpaid accumulation is now so great that it is substantially impossible to provide any new scheme of financing improvement work on this road, and changes have to be made slowly, out of earnings. The Rutland divides the Montreal traffic with the Delaware & Hudson, and has a heavy package freight business between Boston and Ogdensburg, by way of Bellows Falls. Something like half of its entire westbound freight traffic between Rouse's Point, on Lake Champlain, and Ogdensburg, consists of sugar. The road still costs a good deal to operate and there is much to be done to its physical condition. Betterment work on a comprehensive plan out of surplus earnings is slow business, however.

In the New York Central report proper, President Brown, who signs the report for the first time, calls attention to the fact that the relations of the road with its patrons and the communities served by it, have been pleasant, and says that this satisfactory condition has been encouraged by the efforts of the New York and Massachusetts commissions which, handled with less wisdom, might have resulted in friction and controversy. Mr. Brown says that the influence and the cooperation of these commissions have been uniformly beneficial to the road, and have done much to improve the service for the public, and he asks if this very desirable result does not emphasize the advantage of appointing to positions so vitally affecting every business interest of the country, men qualified by experience, temperament and ability to discharge the important duties of their office. "Governmental regulation of railways within proper limitations is of benefit to the public, to the railroads and to those who hold their securities; but in order to secure the maximum benefit for all interests, it is important that men selected for these positions should possess the necessary natural breadth and ability and, in addition thereto, a willingness to undertake the conscientious, painstaking study of conditions necessary to enable them to deal intelligently with the complex and delicate questions affecting transportation that are constantly arising."

The following table shows the results of operation for the last two years:

	1909.	1908.
Average mileage operated	3,782	3,781
Freight revenue.....	\$54,449,281	\$48,561,181
Passenger revenue	29,001,911	26,608,766
Total operating revenue	92,238,523	83,063,820
Maint. way and structures	11,494,023	10,807,335
Maint. of equipment	15,421,648	12,991,416
Cond. transportation.....	33,309,315	33,456,743
Total operating expenses.....	64,593,826	61,289,304
Taxes	4,484,504	4,253,087
Net earnings	24,349,497	18,521,084
Gross income	35,742,357	31,133,080
Net income	13,695,420	9,075,877
Dividends	8,931,600	8,931,600
Surplus for the year	4,763,820	144,277

LAKE SHORE & MICHIGAN SOUTHERN.

Perhaps the most significant facts of the 1909 year on the Lake Shore, as on the New York Central, have been the improvement in rolling stock and in facilities for handling it, and the strong efforts which the management is now making to enable all the properties to operate in harmony. Like the New York Central also, the Lake Shore began a highly successful campaign to get operating costs down after the 1907 year; in 1908 it operated for 64.52 per cent., and in 1909 for 62.12 per cent. In the case of the Lake Shore, moreover, the outside income received in the form of dividends and interest on securities owned or controlled is very important. In 1909, with gross operating income from operation of \$45,110,997 and net operating revenue of \$17,087,336, the company reported total "other income" of \$6,486,887 derived from asset stocks and bonds owned, having a total par value of \$145,288,800, and carried on the company's books at \$101,607,273.

The Lake Shore & Michigan Southern controls and operates under lease the Jamestown, Franklin & Clearfield Railroad. During 1908 and 1909 this road was extended approximately 68 miles towards the Pennsylvania coal fields, reached on the east by the Beech Creek line and, through trackage rights over the Buffalo, Rochester & Pittsburgh, arranged for a term of years, the Vanderbilt lines now have a through route into this central Pennsylvania coal territory, from the north at Geneva, N. Y., and from the west at Ashtabula. It does not seem probable that very much of this coal will be shipped west over the Lake Shore under present conditions, but it is not improbable that a package freight business of some importance can be built up from the Philadelphia and Baltimore district working west, over the Philadelphia & Reading, Beech Creek, Jamestown, Franklin & Clearfield, and Lake Shore into the Cleveland territory.

A significant transaction during the year having a somewhat similar bearing on the Lake Shore is the traffic agreement which has been concluded between the Pittsburgh & Lake Erie and the Western Maryland, by which certain divisions of rates are provided, and these two roads become allies in developing traffic from Baltimore territory to the Pittsburgh territory and west. Before this contract can begin working the Western Maryland must build not far from 100 miles of new line through the extremely heavy country between the West Virginia line and the nearest point on the west where connection can be made with the Pittsburgh & Lake Erie; and the contract does not provide that the Pittsburgh & Lake Erie shall lend its credit for this purpose. The management evidently believes that the connection will be built before very long, however.

Operating 1,663 miles in 1909, an increase of 152 miles over 1908, the Lake Shore showed a net corporate income after operating expenses and all charges, including hire of equipment, etc., of \$11,654,362. From this dividends were paid aggregating 12 per cent. and costing the company \$5,935,980, and a balance of \$5,718,382 was carried forward from the year's operation. That is to say, the Lake Shore earned very close to 24 per cent. on its stock after the usual generous

expenditures for maintaining the property. Operating revenues per mile of road were \$29,122; operating revenues per train mile were \$2.54, and operating expenses per train mile were \$1.58. The revenue trainload reached the impressive figure of 624 tons, and the average haul of revenue freight was 173 miles, bituminous coal, manufactured articles and ores supplying about two-thirds of the total tonnage. The following table shows the unit costs of maintenance, single-track mileage being calculated in accordance with the *Railway Age Gazette* formula:

	1909.	1908.
Maintenance way and structures per single-track mile*	\$1,703	\$1,686
Repairs and renewals: Per locomotive	2,286	1,800
" " passenger car	922	783
" " freight car	90	98

*Total mileage of first, second, third and fourth tracks, plus one-half mileage of sidings.

The following table summarizes general operating results for the year:

	1909.	1908.
Average mileage operated	1,663	1,511
Freight revenue	\$29,735,277	\$25,038,104
Passenger revenue	10,154,220	9,073,669
Total operating revenue	44,757,812	38,758,459
Maint. way and structures	5,468,363	4,796,284
Maint. of equipment	6,811,551	5,452,822
Cond. transportation	13,914,957	13,280,087
Total operating expenses	28,023,661	25,206,504
Taxes	1,458,905	1,433,647
Net earnings	15,549,524	12,418,980
Gross income	22,036,411	17,516,061
Net income	11,654,362	7,676,200
Additions and betterments	1,263,186	1,433,568
Dividends	5,935,980	5,935,980
Surplus for the year	5,718,381	1,740,220

MICHIGAN CENTRAL.

The same general kinds of improvement were shown last year in the operation of the Michigan Central that appeared in the other principal Vanderbilt lines. Operating 1,746 miles, this figure remaining unchanged from last year, gross operating income from rail operations was \$27,415,467, which is at the rate of \$15,698 a mile. The road operated for 67.48 per cent. of gross as compared with 69.29 per cent. last year, and the net revenue from rail operations was \$8,915,939. After all offsets and charges the company had a net corporate income of \$2,872,497 and paid dividends aggregating 6 per cent., costing the company \$1,124,280, the surplus from the current operations after dividends being \$1,748,217. During the year there were issued out of an authorized total of \$25,000,000 20-year 4 per cent. debentures, provided for in an indenture made with the Guarantee Trust Company of New York; \$7,634,000; and the total funded debt now stands at \$42,159,000. Under the New York Central Lines equipment trust of 1907, the New York Central, Lake Shore, Chicago, Indiana & Southern, Michigan Central and Big Four have acquired, between them, 691 locomotives, 153 passenger cars, 16,425 freight cars and 650 company service cars, the arrangement being that the certificates are issued by the Guarantee Trust Company for 90 per cent. of the value of the equipment, and that the certificates are retired by the companies by means of an annual redemption of one-fifteenth of the par value of the certificates issued at the beginning. This financing has been of particularly great help to the eastern lines of the Vanderbilt system, and the Michigan Central in particular has been enabled without straining its credit at all to provide itself with 3,500 freight cars which it greatly needed.

A rather important feature of the year's operations, which affects all the Vanderbilt lines alike, may also well be brought out in this review. On November 10, 1909, the directors approved a plan, taking effect January 1, 1910, for the retirement and pensioning of the employees of the various companies who, through age or disability, became unable to continue in its service. A comparative statement showing this and some other American railway pension systems was published in the *Railway Age Gazette* March 11, page 517; it is sufficient to say here that the plan provides for a pension

board consisting of eight persons, to be appointed annually by the president of each company, and each company authorized a maximum appropriation based on the number of employees, to be made annually for the payment of pensions. The plan provides that all employees who reach the age of 70 years shall be retired, and that such of them as have been in the service for at least ten years immediately preceding their retirement shall be pensioned. Those employees who, having been in the service continuously for 20 years, have become unfit for duty in the opinion of the board of pensions, may be retired and pensioned.

The president points out in the case of the Michigan Central, as of other lines, that general conditions were never more favorable than at the present time, and that every indication points to renewed and increasing prosperity.

The following table shows what was expended during 1909 and 1908 on maintaining way, structures and equipment:

	1909.	1908.
Maintenance way & structures per mile single track*	\$809	\$661
Repairs and renewals: Per locomotive	2,253	2,053
" " passenger car	534	382
" " freight car	84	68

*All mileage of first, second, third and fourth tracks, plus one-half mileage of sidings.

The concluding table shows the general results of operation in 1909 as compared with those for 1908:

	1909.	1908.
Average mileage operated	1,746	1,746
Freight revenue	\$18,267,530	\$16,026,759
Passenger revenue	6,655,699	6,030,419
Total operating revenue	27,222,677	24,051,346
Maint. way and structures	3,458,165	2,781,814
Maint. of equipment	3,756,582	3,009,143
Conducting transportation	10,050,690	9,844,524
Total operating expenses	18,499,528	16,783,768
Taxes	1,121,532	1,105,694
Net earnings	7,748,255	6,318,644
Gross income	8,684,736	7,157,163
Net income	2,872,497	1,627,120
Dividends	1,124,280	1,124,280
Surplus	1,748,217	502,840

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.

The Central Western group of what the New York Central management describes as the allied lines includes the Lake Shore, the Lake Erie & Western, the Chicago, Indiana & Southern, the Indiana Harbor Belt, the Michigan Central, the Big Four, the Nickel Plate, the Pittsburgh & Lake Erie, the Rutland and the Toronto, Hamilton & Buffalo. Having covered operations in the East in our study of the New York Central, in the North in our study of the Michigan Central and our references to the Rutland, and having covered separately the operations of the Lake Shore & Michigan Southern, the rest of the territory in the Central West can be well typified by a study of the report of the Cleveland, Cincinnati, Chicago & St. Louis. This road operates 1,982 miles, of which by far the greater portion is main line. It is located in Ohio, Indiana and Illinois in approximately equal parts, with 35 miles of line in Michigan and fractional track rights in Kentucky.

The characteristics of the operation of the Big Four are that the territory is very highly competitive, and that the company moves a larger proportion of low-grade freight than any other of the main sub-divisions of the Vanderbilt system. Bituminous coal on the C. C. C. & St. L. furnished over 40 per cent. of the total tonnage, while manufactures do not contribute much more than 20 per cent. of the total. The result is reflected in the ton-mile revenue, which is only 5.4 mills this year, while passenger-train revenue per train-mile is \$1.20, as compared with \$1.44 on the New York Central in spite of its enormous commutation traffic out of New York, and with \$1.67 on the Lake Shore & Michigan Southern.

The Big Four earned in 1909 \$27,657,741 from rail operations, which is at the rate of \$13,953 per mile of road, and it operated for 71.27 per cent. After all deductions from gross corporate income, the net corporate income for the year

amounted to \$2,776,372, out of which dividends aggregating \$1,441,126 were paid; 5 per cent. on the preferred stock and 2 per cent. on the common stock; and a surplus from current operations of \$1,335,246 was carried forward.

Within the last ten years the portion of the Central West in which the Big Four operates has had a great growth in population and resources and railway operation there is becoming analogous to that in the eastern states, since the new road built is not very considerable, while large sums are being spent in putting the lines in really first-class condition. This is a matter which does not depend very much on the choice of the executive; the competitive situation is so severe that small advantages have great weight, and must be provided for even at considerable capital cost. During 1909 the Cleveland, Cincinnati, Chicago & St. Louis spent \$944,906 for specific improvement work charged to capital cost, in addition to which charges for maintenance of way and structures and equipment were on a generous scale, as may be seen from the following table:

	1909.	1908.
Maintenance way and structures per single-track mile*	\$1,158	\$1,037
Repairs and renewals: Per locomotive	2,620	2,059
" " passenger car	797	682
" " freight car	88	68

*Mileage of first, second and third tracks, plus one-half mileage of sidings.

The company also spent \$832,030 of which \$669,072 was charged to replacement fund and \$162,958 to capital account. The Big Four has not been as badly off for equipment as some of the other lines in the system, and it took proportionately smaller amounts of new rolling stock under the New York Central Lines equipment trust of 1907. Like the other lines in the system, it inaugurated its pension system last November in the manner described in the report of the Michigan Central.

The following table shows the principal statistical results of operation during the year:

	1909.	1908.
Average mileage operated	1,982	1,982
Freight revenue	\$17,975,353	\$15,250,361
Passenger revenue	7,169,670	6,842,072
Total operating revenue	27,402,194	24,092,604
Maint. way and structures..	3,159,609	2,817,641
Maint. of equipment.....	4,652,610	3,848,424
Cond. transportation	10,434,269	10,307,469
Total operating expenses	19,711,495	18,333,451
Taxes	878,328	829,008
Net earnings	7,011,330	5,062,684
Gross income	7,634,613	5,616,710
Net income	2,776,372	708,779
Dividends	1,441,126	500,000
Current surplus	1,335,246	208,779

NEW BOOKS.

Rapid Transit Routes in New York City. Published by the Public Service Commission of New York State, First District, 154 Nassau street, New York City.

This is a reprint, in pamphlet form, of appendix A of the last annual report of the Public Service Commission. It contains maps, with full historical and descriptive notes, of the elevated and underground railways, built or to be built, or which have been officially proposed under the rapid transit laws.

Freight Transportation on Trolley Lines. By Charles S. Pease. New York: The McGraw-Hill Book Co. Cloth; 5 in. x 7 1/2 in.; 62 pages. Price, \$1.

This is a collection of brief notes on those subjects which would naturally engage the attention of anyone intending to begin or to promote the transportation of freight on electric railways, especially lines in suburban districts. The scope of the work is indicated by the titles of the chapters: The Canvass; Maps and Statistics; Routes and Time Schedules; Stations and Depots; Cars; Side Tracks; Employees; Classification and Rates; Interstate Commerce and Public Service Commissions; Accounts and Stationery; Instructions to Employees; Connecting Lines; The Platform Package System; The Public.

Letters to the Editor.

MACHINERY VS. INGENUITY IN A CROWDED YARD.

St. Louis, March 12, 1910.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In these days of super-protection and multiplication of safety devices to the point of frills and trimmings, it is worth while, as a sedative, to observe how, in many cases, a minimum of apparatus when added to a maximum of common sense and training can accomplish in a perfectly satisfactory manner what our modern methods often fail to do. If we may believe recent reports the Chicago & North Western is about to install in its new Chicago passenger terminal the most elaborate system of interlocking and signaling that it is possible for the signal and operating departments to devise. The whole object of the installation, as of any other, is to expedite traffic in as safe a manner as possible. Now for the sedative. In 1890 there was installed in Kansas City by the Union Switch & Signal Company a hydro-pneumatic interlocking plant to work the switches and signals at the entrance to the Union depot. When first put in service the plant was complete; it was equipped with detector bars, mechanical locking and all other devices considered necessary in those days. As time went on and traffic grew, one thing after another in the way of safety devices had to be sacrificed in order to move without unnecessary delay the increasing number of trains. To-day there is not a detector bar left. All the mechanical locking except that preventing the clearing of conflicting signals has been removed, and switchboard jacks have been provided so that conflicting signals may actually be given by making electrical connections. In fact, a combination board has been set up at one end of the machine to facilitate this practice. Yet there is almost never a failure or derailment. Delays innumerable occur because there is not sufficient yard room to accommodate all of the trains, but not from any fault in the machine. In fact, a complete modern machine would increase the congestion many fold. The secret of the whole matter is this: Speed is strictly limited to five miles an hour, and all the trainmen and enginemen understand the situation thoroughly and co-operate with the signalmen. During the periods of maximum congestion a man is stationed on the ground to help direct enginemen by hand signals, which he gives on the signalman's orders. Mr. Latimer and our British cousins have well said that money invested in discipline yields better returns than that invested in machinery. Of course when the new passenger terminal in Kansas City is built the old hydro-pneumatic machine, the last of its kind, will go to the scrap heap, and we shall probably see a new terminal plant surpassing even that of the North Western; and it will be better so. Then if a collision occurs it can be charged up properly to the negligence of the men concerned. Probably in this country we never shall be able to attain to the perfection in discipline enjoyed by the railways of Europe except in isolated cases and under extraordinary conditions. This being so, we must make our apparatus as near fool-proof as possible and trust to the Lord to remove the fool.

R. H.

Freight rates were advanced on the Austrian State Railroads Jan. 1. The freight earnings in the month of January increased something like 7 per cent., which is attributed chiefly to this advance in rates. It is observable, however, that in the adjacent country of Germany, where rates were not advanced, there was also a large increase in freight earnings, due without doubt to the fact that business is picking up. In Hungary, however, where rates were also advanced, earnings fell off.

Contributed Papers.

THE WHITEHALL SCHOOL FOR STATION AGENTS.

The Delaware & Hudson Company has in operation at Whitehall, N. Y., which is the junction of its Saratoga and Champlain divisions, 77 miles north of Albany, a school of telegraphy which has been running two years and has graduated 37 young men who are now at work for the company as operators or station agents or both. The school as yet has only one teacher, Lewis M. May, who is the principal, but it has had altogether 59 pupils, of whom 16 are now studying. Thus 53 are accounted for. The balance, six, represents the loss—those who for any reason dropped out.

Besides teaching telegraphy, Mr. May instructs his pupils in the principal features of freight office work, and therefore turns out pupils in some degree qualified to take charge of a small station or to assist in a larger one. Pupils usually take seven or eight months to complete the course, and about one-fourth of this time is devoted to the study of freight office work.

The Delaware & Hudson operates 828 miles of road and has over 150 stations. The school was begun at a time when telegraphers were scarce, in consequence of the additional forces required because of the advent of the hours of labor law, and at that time the company, in order to attract applicants, made a contribution toward the board of pupils; and even with this expense the actual outlay by the company was less than \$100 a pupil. At present no allowance is made for board, but those who live near Whitehall are carried free on the trains of the company from and to their homes. All of the pupils now in the school come from villages within 50 miles of Whitehall, and most of them from places within 25 miles, but circulars telling of the advantages of the school have been distributed throughout the company's lines and it is probable that applicants will appear at many other places. This circular reads, in substance:

The Delaware & Hudson Company has established a School of Telegraphy in order that young men may be fitted by proper training to assume positions of responsibility in the railway service.

Equipment and Instruction are provided that makes graduation possible in a few months to those having aptitude for the business. Positions will be found for students that have completed the required course of study.

Thorough instruction in freight office business methods and station management is a specialty of this school. The student will become qualified to fill a position in this line of railway service, in addition to becoming a skilled telegrapher.

To enter this school a young man must be from 17 to 21 years of age, and of sound health; and should be advanced in the study of the English language, mathematics and geography. A certain standard of efficiency will be expected by the school, and a determined effort to master the details of the telegraphic business will alone lead to success. Anyone disqualified for advancement will be so informed when this is noted by the instructor.

Since the school has been established thirty young men have completed the course and have secured salaried positions with this company.

To encourage study in this branch of business the D. & H. Company allow free transportation to and from Whitehall to students of this school residing out of town.

With the facilities provided for practical work, if the student has the ability and desire to advance, the course may be completed in from six to eight months.

No tuition charge is made.

Good board can be secured for \$4.50 per week and up.

Applicants are required to pass the usual physical examinations such as are imposed on applicants for employment, and thus no time is wasted in teaching young men who might prove to be physically unsuitable for the service; and the mental examinations are graduated according to the age of the prospective pupil. Boys of 17 are received if they have a good grammar school education and are otherwise satisfactory; but one of 20 would be called upon to show high school

qualifications or to give suitable evidence of profitable expenditure of his time during the years when he naturally would have been in high school.

In telegraphy the pupils are drilled and redrilled in sending and receiving train orders and messages until they are thoroughly familiar with the work and competent to receive at fair speed. The school is adjacent to and overlooks the main line where all of the trains pass each day, so that the pupils have actual object lessons in connection with the flags and lights on the front and rear ends of the trains. Most of the graduates have done so well that, with suitable caution on the part of the train despatcher, it has been practicable to send them directly from the school to take charge of a small station for an eight-hour day, working the second or third trick.

The principal features of freight office work taught are the making of waybills and expense bills; the writing of the freight-received record and the preparation of the daily reports which have to be sent to headquarters, such as summaries of foreign waybills, etc. The pupils are given practice in balancing daily accounts, but have not as yet been put through actual cash transactions such as are common in business schools.

The school being thus far something of an experiment, it has been kept in a small room where only limited facilities could be provided, but larger quarters are now being prepared and a complete freight-office outfit will be provided.

The pupils are encouraged to inform themselves as fully as possible about railway work by reading, and for this purpose they are supplied with the books listed below, as well as others.

"General Accounts"; "Passenger Traffic Accounts"; "Freight Traffic Accounts," by M. M. Kirkman; and other books on railway station work and accounting, by the same author.

"Railroad Freight Rates," by Logan G. McPherson; "The Working of Railroads," by the same author.

"Diagrams for Telegraph Engineers and Students," by Willis H. Jones.

"Electrical Dictionary," by Edwin J. Houston.

"Catechism of the Locomotive," by M. M. Forney.

"Science of Railways," series, by Kirkman, including books on locomotive operation, locomotive appliances, handling the air brake, etc.

The books dealing directly with the station agent's work are included in a list of required reading, but the reading of those on what may be called collateral subjects, such as the locomotive, is not compulsory.

Half-hour lectures are delivered to the students by superintendents, chief despatchers and division agents, thus furnishing for beginners an atmosphere of reality that might be lacking if they did not have this incentive to extend their thoughts beyond the four walls of the school building.

General Superintendent J. B. McKim informs us that the results of the school have been looked upon by the officers of the road with marked satisfaction, and its scope is being enlarged. Judging by the appearance of the students as a body it would appear that a very satisfactory class of young men has been attracted to the school.

Graduates of the school are now in the service at Addison Junction, Ballston Lake, Cadyville, Center Rutland, Central Bridge, Chazy, Corinth, Dresden, Essex, Fort Edward, Lake Placid, Lion Mountain, Mechanicville, Plattsburg, Port Henry, Port Kent, Saratoga, Standish, Smiths Basin, Westport, Willsboro, Whitehall and a number of other places.

FOREIGN RAILWAY NOTE.

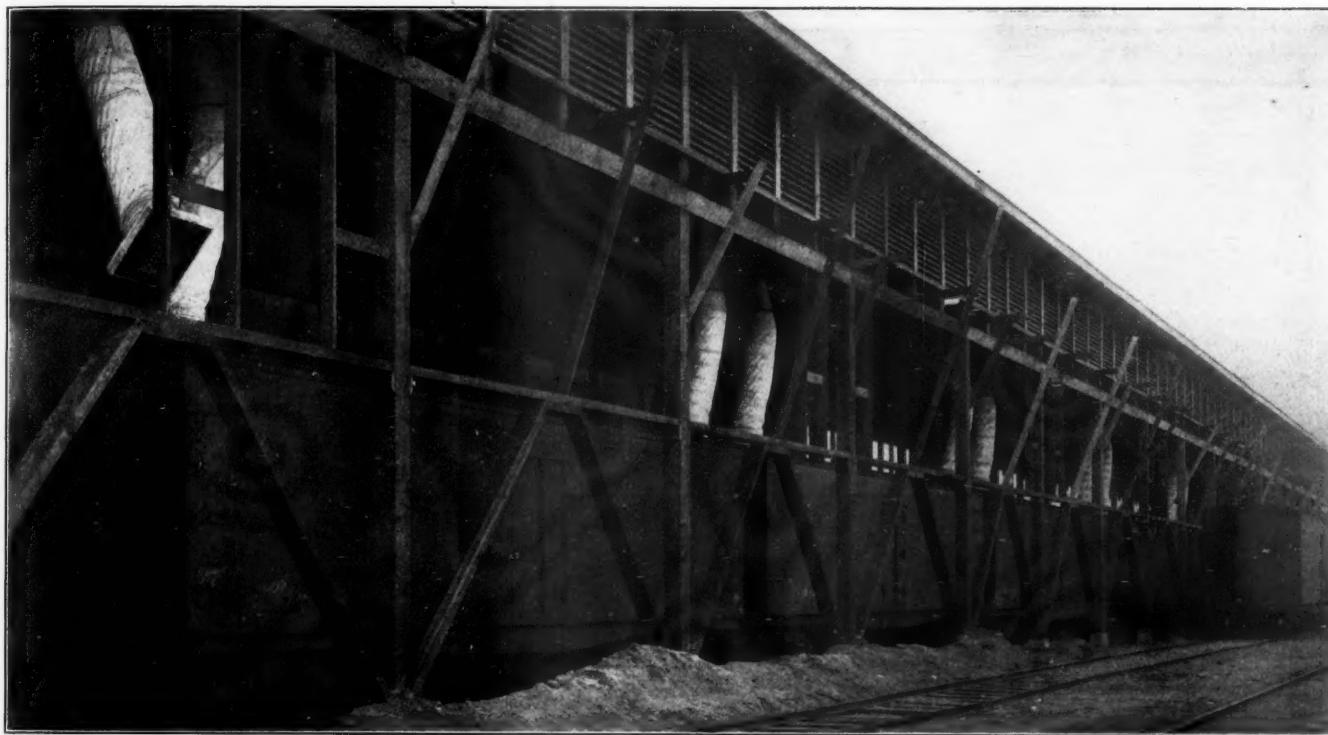
Belgium, a great coal-producing country—for its size—now imports more coal than it exports, due to the fact that it is also a great iron-producing country. Last year its coal imports were 6,452,677 short tons, and its exports 5,580,388. About 40 per cent. of its imports came from Germany; by far the larger part of its exports go to France.

THE PRE-COOLING PLANT OF THE SOUTHERN PACIFIC AT ROSEVILLE, CAL.*

The successful transportation of fresh perishable fruit in refrigerator cars depends primarily on the sound condition of the fruit; on cooling it as soon as possible after it has been picked; on shipping it in packages which cool quickly and thoroughly; on dry cold air uniformly distributed in the car, and on the cooling process being such as will completely cool the center of the fruit. After numerous experiments, means

the business on an extensive scale and have made large expenditures for plants for this purpose.

Two of the largest plants have been built for the Pacific Fruit Express Company, a subsidiary corporation of the Harriman Lines, at Roseville, and at Colton, Cal. Each of these plants is built in connection with large ice manufacturing plants and the cars are iced while standing in the pre-cooling shed. The refrigerating part of the plants at Roseville and Colton are quite similar, but the relation of the precooling to the ice plant and the location of the air ducts are different.



Pre-cooling and Car Icing Shed. Exhaust Ducts Connected to Cars.

have been provided for meeting the above conditions, and the precooling of fresh California fruits in carloads for shipment east has been so successful in preserving the fruit and reducing the expense of icing that the railways have gone into

as will be seen by the plans. At Roseville the car shed is at one side of the ice plant and the precooling houses and ducts are on that side, while at Colton the precooling plants are on the center line and at the ends of the ice plant with the car sheds and lines of ducts at each side.

The Roseville plant was placed in operation October 9, 1909, and has been since in successful operation. The plans and photographic illustrations, with one exception, relate to that

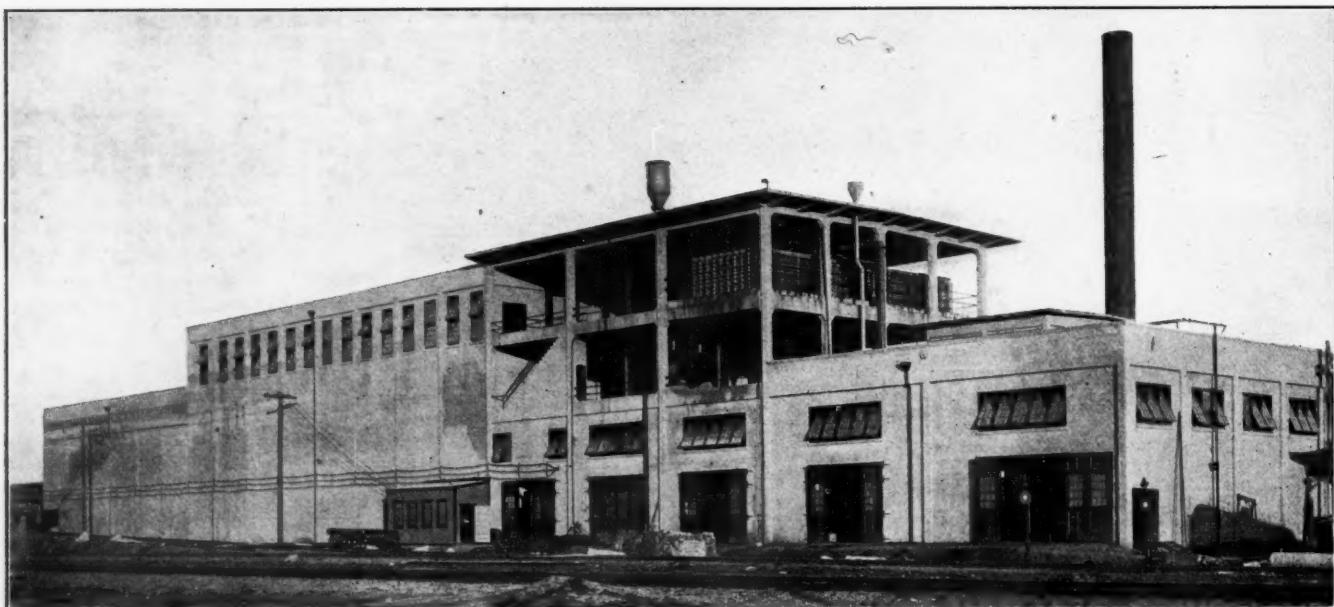


Pre-cooling House with Main Air Duct at the Center. Ice Plant at the Right.

plant. The buildings are of brick and reinforced concrete and the construction is shown in the cross sections. The main building, or ice plant, is 357 ft. 8 in. long and 111 ft. 4 in. wide, with a corner recessed for one precooling building. The second building is at the east end of the ice plant. These precooling plants are each 121 ft. long and 43 ft. 4 in. wide, the main portion being two stories, while the central portion has a ventilating deck or third story. The car shed is 900 ft. long and is built of timber with an upper deck for the main exhaust duct, and a platform for icing the cars; and below is a main pressure duct for cold air. The relation of these

piping and the insulation of the floor of these boxes consists of two layers of 2-in. "Lith" and a 2-in. plank with asphaltum covering. The insulation is laid on 5 in. of concrete and is covered with 2 in. of cement concrete. The ice storage rooms are also insulated with waterproof "Lith" 3 in. thick bedded in a heavy coat of cement. The "Lith" is covered with a facing of union cork board bedded in waterproof cement.

The precooling method used at Roseville and Colton is the intermittent vacuum process invented by A. R. Sprague, the object being to withdraw the heated air and gases which emanate from warm fruit and cool the fruit clear through by



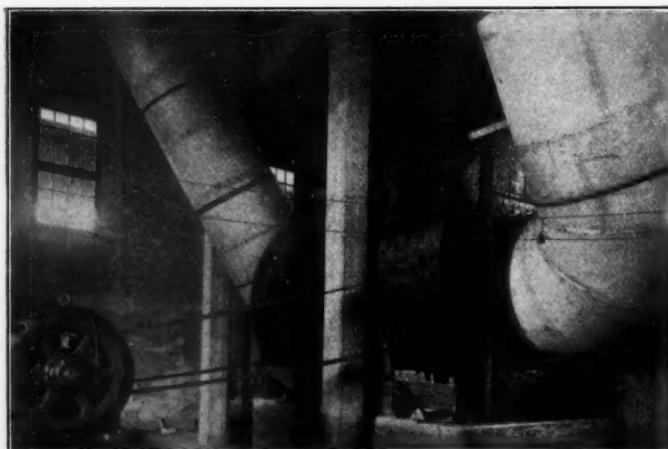
Ice Plant at Roseville, Cal.

Southern Pacific Company.

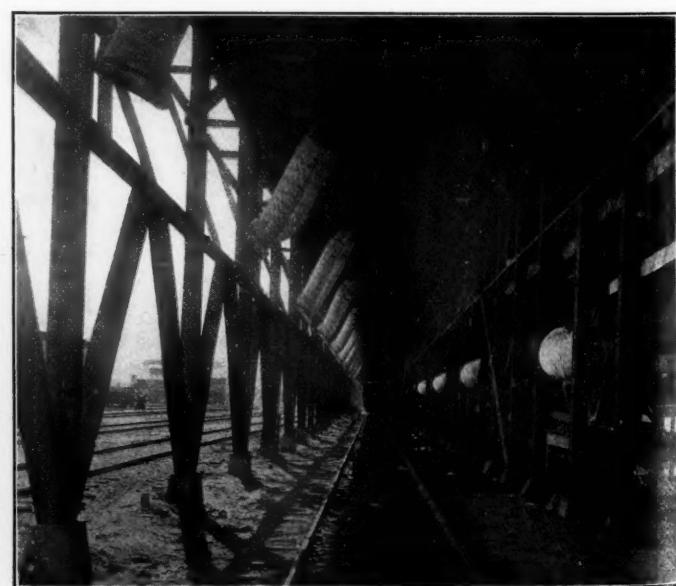
to the refrigerator car is plainly indicated in the sectional view which illustrates the fans. The Roseville plant has a capacity for precooling 24 cars of fruit at once, and the temperature of the car and contents is reduced from normal, 70 or 80 deg. F., to 40 deg. F. in two hours. The ice plant has a capacity of 250 tons daily and a storage capacity for 20,000 tons. In the construction of these buildings a large amount of insulating material was used, which was supplied and installed by the Union Fibre Company, Winona, Minn., the Roseville plant requiring 152,200 feet of "Lith" board and 128,370 ft. of union cork. The bunker room or air cooler is 80 ft. x 26 ft. with upper and lower sections. The walls of the rooms are made of terra-cotta tiling, the section having two 4-in. tile walls with two layers of 2-in. "Lith" insulation between. The coil boxes are filled with direct expansion

subsequent cold blast. The walls of the car are also cooled down so that the first icing does not melt rapidly and the car will travel much farther before re-icing is required. There are two series of main ducts. One is for exhaust overhead in the car shed, with branches leading to the roof openings of the ice boxes. The other is a cold blast duct running along the first floor with branches having large rectangular openings which fit with proper packing into the side door opening of the refrigerator car.

The intermittent system stops the cold blast for a brief



Exhausters in Pre-cooling Plant.



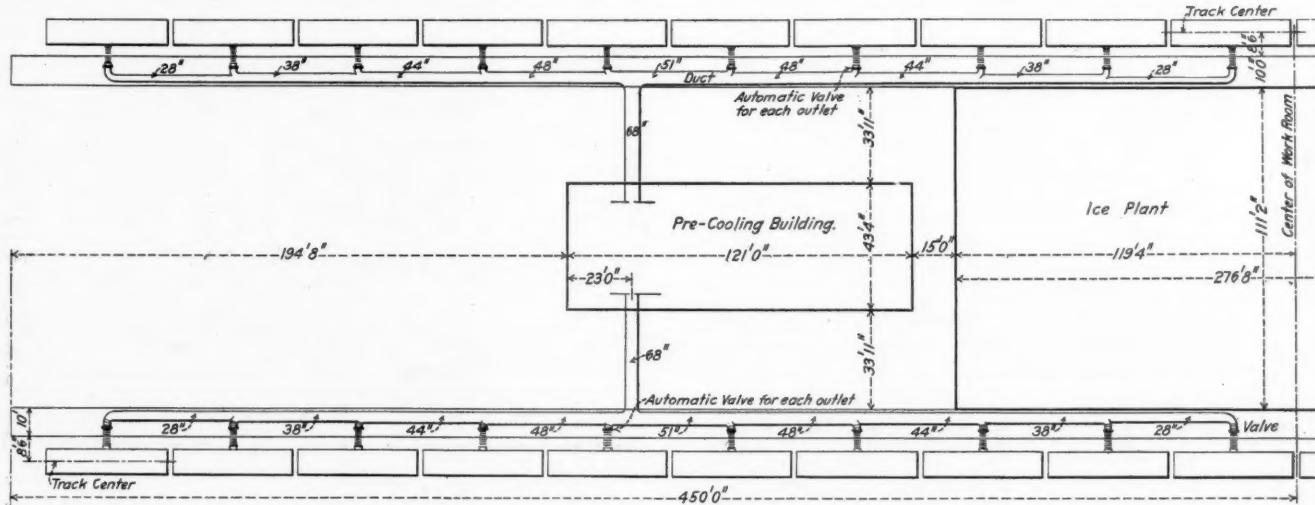
Train Shed of Pre-Cooling Plant. Exhaust Ducts Above Track

period while the exhaust continues until a partial vacuum is produced within the car, causing the fruit to part with its warm vapors. During this period the exhaust is discharged into the open air. The vacuum is produced at intervals of 5 to 15 minutes, depending on temperature conditions. The valves are regulated automatically so that when the discharge to the open air is closed the cold blast valve is opened and the cooling process continues, but with the discharge entering the cold air chambers, where it passes over the coils, and is cooled and deposits its moisture. The cold blast to the car is then dry. During the exhaust period the gages should show a vacuum of 2 to 2½ in. at the center of the packages, and the precooling is continued by this intermittent process until the walls of the car have a temperature of about 25 deg. F. While

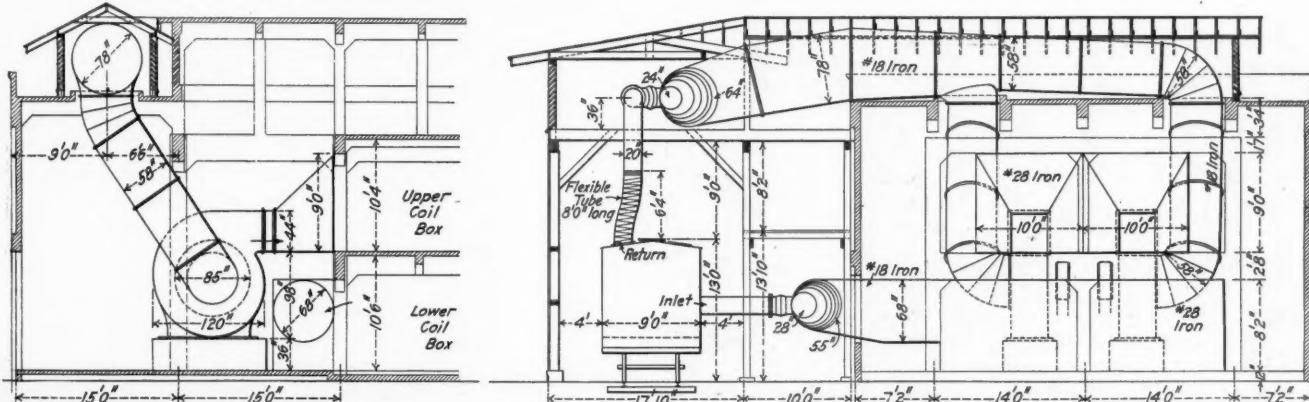
two exhaust fans are driven by Westinghouse electric motors.

The refrigerator plan consists of two 250-ton machines each consisting of double acting "York" ammonia compressors with cylinders 24 in. x 40 in. driven by a tandem compound Corliss engine with cylinders 24 in. and 46 in. in diameter by 36 in. stroke. The ammonia condensers contain 48 coils of 2-in. galvanized pipe each 20 ft. long and 24 pipes high. The freezing tanks and ice cans are similar to those in large modern ice plants. There is ice storage room under the tanks for 6,000 tons of ice and in other parts of the building for 14,000 tons.

The complete plant was designed by A. Faget, consulting engineer, San Francisco. The Sprague patents on the Intermittent Vacuum Precooling process, which was used in the



Arrangement of the Pre-cooling Plant at Colton, Cal. Southern Pacific Company.



Sections Showing Fans and Air Ducts. Pre-cooling Plant at Roseville, Cal.

the temperature of the cold blast is as low as 5 deg. F., that of the fruit equalizes at about 40 deg. F.

The main exhaust pipe is made of No. 18 galvanized iron 78 in. in diameter from the fan to the main connection where it branches into two longitudinal pipes parallel with the track, and these are reduced from 60 in. in diameter to 24 in. at the ends, as shown in the drawing. The down pipes to the car roof openings are 20 in. in diameter, and 8 ft. from the end are made of flexible canvas so as to adjust themselves to the varying position of the car. These flexible down pipes are plainly shown in the illustration. The cold blast pipe is 68 in. in diameter where it leaves the coil boxes, and is reduced to 28 in. at the end of the main. The plan view of this pipe is shown in the drawing of the Colton plant.

There are two exhaust fans in each precooler house. These exhausters were supplied by the Buffalo Forge Company, and have wheels 85 in. in diameter by 27 in. wide. The capacity of each fan is 44,500 cu. ft. air per minute under pressure of 3 oz. and at a speed of 380 revolutions per minute. The

plant, are controlled by L. H. Roy, Chicago. We are indebted in the Pacific Fruit Express Company for the drawings and photographs here reproduced.

The budget for the Swiss Federal Railways for 1910 is as follows: The estimates for the operating receipts are \$33,580,000, and the operating expenses \$23,490,000, leaving the net earnings \$10,090,000. The profit and loss account is estimated as follows: Receipts, including the \$10,090,000 net earnings, \$12,102,000; expenditures, \$13,090,000, leaving a deficit of \$988,000, against a deficit, according to the budget, in 1909, of \$1,115,000. The principal receipts outside the net earnings were from withdrawals from the renewal fund, \$1,388,000, and interest from the renewal fund, \$518,000. The expenditures are given as follows: Interest on consolidated debt, \$8,946,000; amortization, \$1,453,000; deposit in renewal fund, \$1,740,500; interest, commissions, etc., on temporary loans \$726,000; part payment deficit of the pension and loan fund, etc., \$192,000; all other, \$32,500.

SUBAQUEOUS TUNNELS.*

BY R. B. WOODWORTH,
Engineer with the Carnegie Steel Company, Pittsburgh, Pa.

II.

The method of removable steel forms has also been used in building the Southwest water tunnel in Chicago, built by the George W. Jackson Co., Inc., while the Blue Island tunnel was 8 ft. inside diameter, the Southwest water tunnel is horse-shoe shape in cross-section of variable dimensions equivalent at different points to 12-ft., 14-ft. and 16-ft. cinches. In this instance, the lagging ribs were 6-ft. channels. This form of interlocking steel ribs, or some similar method of construction, will doubtless reduce very materially the cost of concrete lining; so also will doubtless the use of the telescopic collapsible steel form and traveler, manufactured by the Ransome Concrete Machinery Company, and described in the October 2, 1909, issue of the *Engineering Record*.

Reinforced concrete commands itself for rock tunnel lining. Whether or not it will eventually replace brick for such purposes will depend on its performance in recent installations. What form the reinforcement will take will depend largely on circumstances, but the reinforcement should always be designed to increase materially the strength of the concrete and be in such form as to perform the most service for the least weight. In the construction of the Aspen tunnel, of the Union Pacific, in Wyoming, unexpected difficulties were encountered. A double track tunnel was driven by the ordinary American method of taking out and timbering the top third of the excavation and the benches were removed by the use of the steam shovel. The material through which the tunnel penetrated was exceedingly unstable, being a disintegrated soft shale rock. Here slips were frequent and heavy timbering was used to overcome the tendency of the whole mountain to slide into the excavation. When heavy timbers proved too



Fig. 3—Steel Tunnel Supports Twisted Under Pressure of Disintegrated Soft Shale Rock.

light 12-in. 31.5-lb. beams bent to the curve of the tunnel and erected in three sections spliced together were tried. These also proved too light for the work and many of them were seriously bent and twisted under the tremendous earth pressure, as shown in Fig. 3. The settlement was finally stopped and the tunnel completed by the use of 12-in. 55-lb. I-beam rings spaced two feet center to center and filled in solid by concrete, as shown in Fig. 4. Inasmuch as steel mine timbers, in more or less similar form, have been found

*From a paper read before the Railway Club of Pittsburgh.

highly satisfactory in coal mining operations in this country and abroad, there seems to be no reason whatever to prevent their similar use in standard railway tunnel construction where heavy loads are to be sustained and where the ordinary methods of timbering appear likely to prove inadequate.

SOFT GROUND TUNNELS.

The essential differences between a rock tunnel and a soft ground tunnel is that the former is drilled and blasted while the latter is bored and dug; machine drills give place to

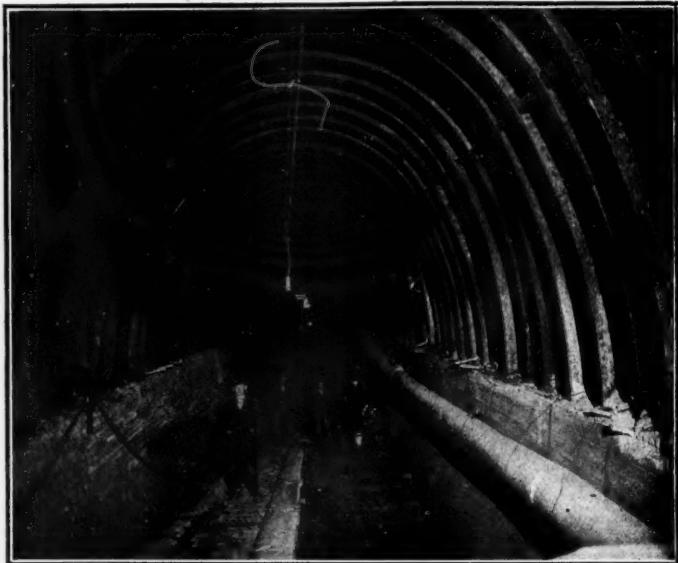


Fig. 4—Supporting Structure Finally Adopted in Place of That Shown in Fig. 3.

augers, and timbering common in stable ground is replaced by the foregoing method of construction. If the ground contains no water and danger of subsidence is small, the timbering necessary is reducible practically to the amount required properly to support the excavation during the process of lining. If, however, the material contains water and the excavation is carried on at shallow depth in close proximity to buildings, the use of a shield may be found desirable, and so also may the use of compressed air at a low pressure, ordinarily ranging up to 8 or 9 lbs. above normal.

The largest system of soft ground tunnels in the world is the network built by the Illinois Telephone & Telegraph Company below the streets of Chicago which now extend 66 miles. These were first built for telephone and telegraph cable conduits and have been later extended to carry a narrow gage transportation system for freight traffic. The tunnels, of a horse-shoe form 6 ft. wide and 7 ft. 6 in. high inside dimensions, are constructed of concrete 10 in. thick on the crown and sides and 13 in. at the bottom. The method of construction was as follows:

The bore was dug in the clay for a distance of 20 ft. and about a foot larger all around than the completed tunnel. The 13-in. concrete bottom was then put in place and upon this were placed forms made of 5-in. channel bars in two pieces, curved to the exact size of the inside of the completed tunnel. Outside of these forms boards 20 ft. long were placed, one at a time, on each side and the concrete rammed into the space between the boards and the clay. When the crown forming the key was reached boards 3 ft. long were used. It was afterwards found better to build 15-ft. sections instead of 20-ft. The concrete was composed of one part Portland cement, three parts sand and five parts gravel.

The tunnels were commenced in September, 1901, and were driven in stiff blue clay containing very little water, but occasional pockets of gas and quicksand were encountered. As a precaution the work was all done on the pneumatic system, the air pressure being about nine pounds per square inch.

The material was excavated with spades and drawknives and hauled away in small cars 20-in. x 48-in. inside measurement. The main tunnels are built at a depth about 20 ft. from the street surface to the crown of the tunnel. As they are located under the center line of the street, they are clear of the lines of pressure from the buildings and are subject only to the pressure due to the overlying material. The work, therefore, is delicate in its nature, but with the low air pressure there has been practically no trouble from settlement of the ground; where driven without air small subsidence has sometimes occurred.

The intake tunnel of the Municipal Water Works of Gary, Ind., built 1908-09, is likewise an example of the soft ground tunnel driven without shields. This tunnel has a horseshoe shaped cross-section equivalent to a 6-ft. circle and a total length of approximately 15,000 ft. It is being driven through the thick stratum of clay underlying Lake Michigan and at a depth of about 20 to 30 ft. above bed rock. A section of tunnel about 225 ft. long was first driven from the bottom of the pump shaft and lined without the use of compressed air in the heading. An air lock was then installed at this point and since then all the operations in the heading have been handled under air pressure. The work in the heading is prosecuted by three 8-hour shifts of laborers. The mining is done by two shifts which advance the heading 24 to 27 ft. under normal conditions, and the concrete lining for the bore of the tunnel is placed by the third shift, so that 24 to 27 ft. of lined tunnel are completed every 24 hours. Most of the clay removed is of such a nature that it can be cut with a drawknife, although sharp spades and adzes are occasionally used. The excavation is not timbered as it progresses since an air pressure of 12 to 16 lbs. is sufficient to maintain the shape of the bore until the concrete lining can be placed. The forms for the concrete lining consist of pieces of 3 in. wooden lagging 3 ft. long, which are held in place by tee iron ribs bent to the horseshoe shape of the tunnel cross-section. These ribs are spaced 3 ft. apart on centers and are made in three pieces to permit of ready removal.

The Baltimore Belt Tunnel, Baltimore, Md., 1.4 miles long, is a double track tunnel through sand and clay, built by the crown bar method of timbering in 1890-1893, and is notable on account of an attempt to carry forward the excavation by means of a roof shield running on side walls built previously.

The construction of tunnels by this half shield method proved successful in 1896 on a portion of the Boston subway under Tremont street and the system has had rather wide application. The shield weighed about 22 tons and was calculated to sustain an approximate load of 640,000 lbs.; was 29 ft. 4 in. wide over all, with a rise of 4 ft. 4 $\frac{1}{8}$ in. and was composed of two plate girders 3 ft. 8 in. deep and 4 ft. apart with cover plates extending 4 ft. beyond the girder, while an additional top plate extended 2 ft. in the rear. Under each foot of each girder was an iron casting which fitted into a recess in the cast steel shoe. These shoes rested upon two lines of 10-in. steel I-beams imbedded in the concrete side walls forming the track upon which the roof shield slid as it was pushed along. The shield was propelled by 10 6-in. hydraulic jacks located around its upper portion. The outer ends of the plungers were fitted with collars which abutted upon 2 $\frac{1}{4}$ -in. cast iron round bars built into the brickwork of the arch and forming continuous lines of metal to resist the thrust of the jacks. This device was apparently first used by Walter I. Ains in the East river gas tunnel at New York City. As soon as the shield had been pushed forward about 3 ft. the timber centering was erected behind it and the brick arch lining of the tunnel built. During this time a heading 6 ft. high and the whole width of the tunnel was excavated ahead of the shield and supported by posts and poling boards; which were removed as the shield reached them. The material was mainly gravel and stiff clay. The depth of earth above the tunnel varied from 6 ft. 9 in. to 13 ft., and a progress of

about 50 ft. per week was made. The two side walls were built in advance headings. The arch was built by means of the shield and the center core of material was removed later.

The half-shield method has also been employed in 1908 in the construction of the intake tunnel of the Lawrence avenue pumping station, Chicago, Ill., 1,446 ft. long. This tunnel is used in connection with the intercepting sewerage system of Chicago for furnishing water from Lake Michigan for dilution of the sewage and is believed to have the largest cross-section of any that has been built for similar purposes. It has a full center arch with a span of 20 $\frac{1}{2}$ ft. with a rise of 8 ft. 11 in. The bottom is an inverted flat arch so that the total height of the structure at the center line is 14 ft. The cross-sectional area is slightly more than equivalent to a 16-ft. circle.

The cover between the crown of the arch and the bottom of the lake varies from 18 ft. at the outer end of the tunnel, where it is made up of 4 ft. of sand at the top and the remainder clay, to 34 ft. at the shore shaft. The upper part of the bed of clay is of a soft blue character which increases in stiffness with the depth, so that the invert and the bench walls of the arch of the tunnel are founded on hardpan. Owing to the large area of cross-section it was considered impracticable to make the whole bore at one operation. The plan was, therefore, adopted of driving two headings, each 7 ft. high, 6 ft. wide at the top and 9 ft. wide at the base, for the bench walls of the arch and of building these walls in advance of the removal of the core of the excavation and the completion of the balance of the tunnel. The drifts were excavated by hand with draw-knives, adzes and similar tools without air pressure, though they had to be lined closely with bents of 8-in. x 10-in. timbers.

The shield used in driving the main tunnel excavation was built up of steel plates and structural shapes and conformed in outline to the arch of the tunnel. It traveled on rails laid on the bench walls of the arch built of concrete in the advance headings. The shield was five feet long with a projecting cutting edge around its rim at the front end and was braced apart at the bottom by a horizontal steel platform carried by five 10-in. 40-lb. I-beams. A heavy plate on the bottom of each side of the shell of the shield rested directly on a pair of rails on timbers carried by the corresponding bench wall. The shield was advanced by means of 12 6-in. hydraulic jacks equally distributed around the periphery of its shell. The work was carried on under an air pressure of 8 lbs. as an assurance against difficulty and the regular sequence of operation was as follows:

First the concrete bench walls were built ahead 150 to 200 ft. in the side headings. When the concrete had set the shield was pushed ahead with its own jacks which reacted against the timber lining of the excavation. This lining consisted of segments in 3 and 4-ft. lengths cut from 7-in. x 10-in. oak timbers and was placed immediately following the shield to retain the soft bulging clay through which the greater part of the tunnel is built. The brick arch was constructed in sections 22 ft. long from a timber traveler of that length which operated on rollers on timber laid on the hardpan. After the arch work was built the excavating and concreting of the invert were completed.

The latest practice by French engineers in shield construction is shown in Fig. 5, which is a cross-section of a tunnel with the shield in place used in the construction of the Metropolitan Railway, Paris. The roof of the Metropolitan Railway tunnel is but little below the surface of the street and the tunnel is a double track structure with a clear span of 23.29 ft. and with a rise of 6.79 ft. in the arch. The arch abutments and floor are all of masonry. The first portion of this tunnel was built in 1898 with a half section shield on which the arch was built and the abutments built last, but the results were not satisfactory and the failure of the shield was largely due to the fact that the soil penetrated was not homogeneous. Then, too, in moving forward the shield carried with it around

its outer surface a certain thickness of earth which caused undulations on the surface ground and by its broken condition threw too much weight on the tail end of the shield. There was thus a tendency in the shield to rise at the forward end, while the fresh arch masonry was damaged under the friction of the shield when it was moved forward.

The characteristics of the new roof shield designed by the engineers Radenac and Raguet to avoid these troubles were its length and the more stable support provided for the shield rollers when the shield moved forward. In actual use the shield has been advanced as much as 20 ft. in 24 hours. The shield was made of an outer steel shell-shaped with the extrados of the arch and its total length was 24 ft. 6 in. This shell was supported by four cross-beams connected by 38 longitudinal girders, of which 20 extended forward to support the front end and 18 were on the rear end. The webs of the

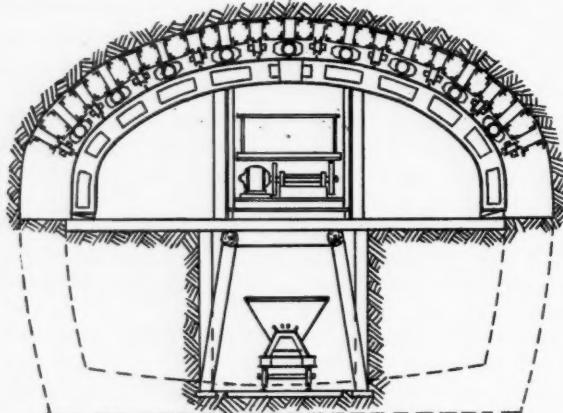


Fig. 5—Shield Construction Used in the Metropolitan Railway Tunnel, Paris, France.

girders were stiffened with angle iron, making a beam box of each pair of girders. Ten of these box beams supported the rollers on which the shield was moved and nine of them carried the hydraulic jacks. The total weight of the shield and its framework was 34 tons. The steel cutters on the front of the hood were eight in number. The rollers were not operated on top of freshly laid masonry, but traveled on steel centers which were built of beams shaped to the arch and divided into two equal parts connected by bolts. The foot of this center extended about 18 in. below the spring of the arch and rested upon a cross-tie made of two steel plates and angles. This tie obviated the tendency in the center to spread and the whole center was carried on longitudinal sills supported by posts driven in the undisturbed ground of the lower advance gallery. The movement of the shield over these centers was very steady and the surface undulations did not exceed 3 in. The hydraulic jacks were 8 ft. 8 in. long and had a stroke of 3 ft. 7 in. They were fastened to the shell of the framework and their pistons acted upon thrust blocks set between the center ribs. As these ribs were theoretically immovable, the shield shell and its framework advanced. As the shield moved forward, sheets of thin steel replaced it to prevent the earth from falling in. These plates were held in place by temporary timbering until the masonry was completed, the plates remaining in the ground. The masonry was built on wooden lagging laid on the steel centers.

The most recent example of the half shield method of construction in soft soil is to be found in the construction of the Detroit River tunnel, of the Michigan Central, now building. The total length of this tunnel is 12,800 ft. made up of 1,540 ft. open cut, Detroit end, 2,135 ft. approach tunnel, Detroit end, 2,625 ft. subaqueous, 3,100 ft. approach tunnel, Canadian end, and 3,400 ft. open cut, Canadian end. The cross-section of the approach tunnels on both sides of the river is practically the same, each consisting of two single track structures with a vertical wall 4 ft. thick between. The roof of each half

of these structures is a full center arch 2 ft. thick on the American side and 2 ft. 6 in. thick on the Canadian side with an inside radius of 8 ft. 3 in. and a clear height of 18 ft. above head of rail. Owing to the great extent of the excavation required it was realized that if it became necessary to handle the excavation by the shield method operating either in the open or under pneumatic pressure, a shield large enough to permit the twin tunnels to be built simultaneously would be impracticable. The decision was, therefore, made to run a drift of sufficient cross-section to permit the construction within its limits of the common center wall, and after this wall had been placed, to start the heading of the twin tunnels, thus utilizing the massive core of concrete both as a guide and as a basis for the excavating and concrete work to follow.

The 10-ft. 5-in. x 14-ft. center headings were carried through on the Detroit side without the use of air pressure, but all the work was heavily timbered as rapidly as the headings advanced. On the Canadian side difficulties were encountered in the blue clay through which the headings advanced, and on account of this condition a shield was used in driving the center heading on a portion of the approach tunnels. The design of this shield, which was rectangular in shape, having a total height of 16 ft. 5 $\frac{1}{2}$ in. and a total width of 12 ft. 4 $\frac{1}{2}$ in., does not concern us here. Suffice to say that work on the drift with this shield was advanced sufficiently far to permit the excavation of the center wall. The character of the clay, however, required the center sides and roof of the bore to be heavily timbered. After the center wall had thus been constructed a sufficient distance in advance, the side shield shown in Fig. 6 was used for the remaining excavation.

Four of these shields, built according to the same general design, were in operation, one in each of the two headings

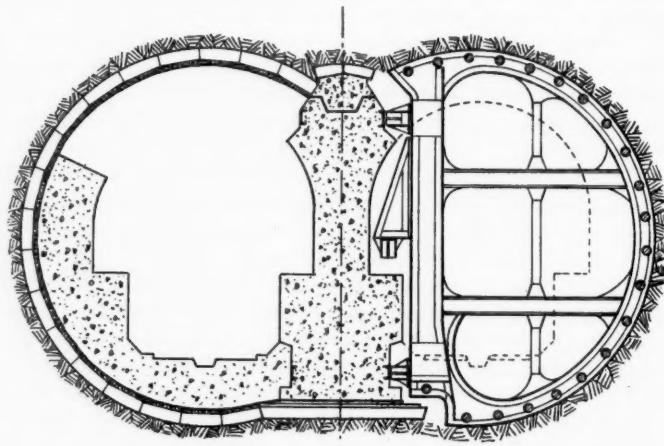


Fig. 6—Side Shield Used in the Land Portion of the Detroit River Tunnel.

being advanced on both sides of the river. These shields are slightly more than half cylinders 27 ft. 1 $\frac{1}{2}$ in. in diameter. The cutting edge is confined to the circular portion and the shield is advanced by 21 8-in. hydraulic jacks placed around the cutting edge. Although the course of the shield can be determined to a certain extent by these jacks, it is necessary to guide chiefly from the finished center wall. Under normal conditions the weight of the shield and its load are carried by the lower portion of the curved section of the casing, which has a total width of 13 ft. from the cutting edge to the rear of the shield. Two heavy shoes, having their faces vertical, are mounted on the outside of the vertical section of the shield, one near the top and the other close to the bottom, and bear against the rear face of the web of a 12-in. steel channel set horizontally in the concrete of the center wall. To provide for emergencies a third shoe with its face hori-

zontal is mounted on a heavy knee brace on the vertical section of the shield in a position directly over the bench on the center wall.

The excavation made in connection with the shield is lined immediately in the rear of the latter with continuous rings consisting of 4-ft. segments cut from 12-in. x 12-in. maple and beech timbers wedged in place to insure a lining fully capable of carrying the load until the concrete has been placed and has received its set. This lining of timber rings is finished with a ring of 2-in. x 2-in. beech lagging to give a smooth surface for the waterproofing, which consists of three-ply roofing felt laid in hot straight run coal tar pitch. The arch of the tunnel is built in 12-ft. sections after the invert and side walls have been built. The invert and side walls are built by the use of removable steel forms made in sections 2 ft. wide of $\frac{1}{8}$ -in. plates with a 2-in. x 2-in. x $\frac{1}{4}$ -in. angle riveted along both sides of each 3-ft. section, and horizontally every two feet, to stiffen them. The arch forms also consist of steel ribs built up of two angles and a plate with these ribs spaced 3 ft. 9 in. apart on centers, and lagged with 3-in. planks attached to them by wood screws. The arch forms are advanced in 12-ft. sections by means of a traveler car.

(To be continued.)

MOVEMENT OF PASSENGERS ON PLATFORMS AND STAIRWAYS.*

In this proposition the small area of land required for underground terminal facilities was very costly, involving an average price of between \$40 and \$45 per square foot for purchase, exclusive of the payment under franchise provisions for lease and use in perpetuity of the underground space of the adjacent streets. The elevation of the tracks in the station was determined as 11.7 ft. below mean sea level, or at a depth of 36.86 ft. below the street surface at Church and Dey streets, and this depth was altogether too great for the movement of passengers up and down without an intermediate landing. For railway operation the shorter the movement vertically or horizontally between the concourse, or distributing floor, and the cars, the better, and as the clearance needed for the cars was only 12 ft. 6 in. above top of rail, and the floor depth required was only 24 in., a grand concourse was laid out at an elevation of 4.33 ft. above mean sea level. In this case there was an added advantage, as at this level the concourse could be constructed continuous under Dey street and practically over the entire area of the station site. The only necessary function, therefore, of the street level in connection with the railway station was to provide adequate access and egress for passengers, well distributed, to the concourse floor, and with that exception the entire surface area was available as part of the office building now developed.

The provision of platforms, stairways and openings had next to be considered. To do this intelligently it was necessary to work back from the ultimate carrying capacity of the tunnels. The capacity of each pair of tunnels is one trainload of 800 persons on a headway of 90 seconds, or say 530 persons per minute, and this number either arriving or leaving at times of maximum movement in one direction, as the reverse movement is always comparatively light. Two terminal station tracks will easily take care of this service, allowing three minutes for the train to enter and stand in the station. As there are two pairs of tunnels provided for the future (one pair of which is now in operation), the station was laid out with four operating tracks, and an additional track, allowing only for unloading passengers, for car inspection and for storing disabled trains. The unloading

platform widths and areas need to be sufficient to hold only such part of the trainload as would not have passed onto the stairs when the last portion of the trainload has discharged, and obviously a floor area equal to the train itself is more than adequate providing there is no undue congestion on the stairs. In order to load a train promptly the loading platforms should have sufficient area for a trainload of passengers to stand without undue crowding, largely grouped along the edges at the points where the car doors come when the train stops, with sufficient space in addition to permit a free passage through the crowd being maintained. The width should be greater than that of the unloading platforms and should not be less than twice the width of the trains. Alternating the platforms as before mentioned and thereby maintaining one way movement permits this. The platforms as finally arranged are as follows:

Along the Church street side, an unloading platform 11 $\frac{1}{2}$ ft. wide serving one track; area, 5,200 sq. ft.

Between tracks Nos. 1 and 2, a double loading platform 22 ft. wide; area, 9,000 sq. ft.

Between tracks Nos. 2 and 3, a double unloading platform 11 ft. wide serving two tracks; area, 9,300 sq. ft.

Between tracks Nos. 3 and 4, a double loading platform 22 ft. wide serving two tracks; area, 9,300 sq. ft.

Between tracks Nos. 4 and 5, a single unloading platform, 13 ft. wide, serving No. 5 track only in emergency and being regular only for No. 4 track; area 5,400 sq. ft.

To ascertain the necessities in respect of stairs and passages, count of actual movement of traffic at congested points in New York was made, notably at the Brooklyn bridge. In a straight passage of ample width the "rush hour" New York crowd moves at the rate of 300 ft. per minute, walking with a step averaging 30 in. There is only a small reduction in this speed on ramps of, say, not over 10 per cent. grade. At this rate each person averages about 10 sq. ft. space occupied and the movement discharges about 30 persons per foot of width of passage. If the passageway becomes too congested, the space occupied per person reduces and the speed of movement also reduces, but the number discharged remains about the same, 30 per minute. Any contrary movement in a broad passage reduces the movement rather more than the relative space occupied in multiples of say 30 in. per person, but in narrow passages the relative reduction is much greater, notwithstanding that persons crowd into smaller space, not over 24 in. width.

A crowd moving freely upwards on stairs takes about the same number of steps per minute, say 120, but advances only about 12 in. horizontally instead of 30 in. Upstairs movement is much more dense than downstairs, but correspondingly slower. We have counted discharge on stairs of 24 persons per foot of width per minute moving upwards, but never more than 18 per foot of width moving downwards. There does not appear much difference in discharging rate on stairs above 4 ft. wide if the movement is all in one direction, but stairs of all widths (particularly below 8 ft. wide) are seriously impeded by any contrary movement even when only four or five persons per minute are moving in the direction reverse to the heavy traffic. Generally, for stairs above 4 ft. width, all movement in one direction, actual count indicates:

Upwards—Maximum 20 persons per foot of width of stairs per minute. Average for ordinarily free moving crowds, 15 per minute.

Downwards—Maximum 18 persons per foot of width of stairs per minute. Average for ordinarily free moving crowds, 13 per minute.

In case of any contrary movement it is most important to force the people to a right-hand direction of movement, and speaking generally no stairs serving traffic in contrary directions for railway service should be permitted to be installed of less than 5 ft. clear width.

In unloading railway trains in rapid transit service, it is very important to distribute passengers as quickly as possible, particularly in discharge, and in such a problem as ours to get them off the track platforms as rapidly as possible and with the least amount of walking along the platforms, allow-

*From a paper by J. Vipond Davies and J. Hollis Wells, read before the American Institute of Architects at Washington, D.C., December 16. This paper deals with problems connected with the design of the "Hudson Terminal" of the Hudson & Manhattan at Cortlandt street, New York City. A description of this terminal and of the tunnel under the Hudson river, written by Mr. Davies, was published in the *Railway Age Gazette* of September 17 and 24, October 1, 8, 15, and 22, 1909.

ing them the more easily to freely distribute themselves on the great concourse floor. In a full train there are, say, 20 door openings in the train, all simultaneously discharging practically a single line of persons. Therefore, we located stairways on all the unloading platforms in tandem, six stairs to each, distributed as nearly uniformly along the platform lengths as possible. No. 1 platform has an aggregate of 26-ft. stairs to discharge at the rate of 880 persons in a three-minute interval, or 266 persons per minute, or, say, 10 persons per foot of width of stairs. No. 3 platform has six stairs (one not fitted until needed) aggregating 48½ ft. width for discharge of 800 persons in 90 seconds, or say nine persons per foot of width per minute.

For the loading platforms, it was important for the economical operation of the railway to group the landings on the concourse floor, and consequently it was necessary to provide for this service only four stairs per platform in pairs. These have an aggregate width of 32½ ft., and maximum passenger movement of 16 persons per foot of width per minute, on the assumption that the train is fully loaded at the terminal station and no consideration given to local movement at other stations. The arrangement of stairway heads on the concourse floor tends as far as it is possible to thoroughly distribute the movement, and also to separate the incoming from the outgoing traffic. The distribution of the streams of traffic cannot be too thoroughly separated to obtain the best results.

The first essential purpose of this railway and station is for the operation of a purely local rapid transit passenger service, but, as before stated, the railway was to operate a terminal service for the various steam railways in Jersey City and Hoboken.

The concourse floor has ticket offices for the trunk line railroads, enabling them to sell all classes of tickets for all points on their lines for trains departing and to advertise schedules of trains departing from Church Street Terminal. A train leaving at an advertised time becomes the train connection for the specified steam railway train from New Jersey. The ticket examiners at the ticket barriers on the concourse floor announce the train connection and at the leaving time of the train deliver a clearance ticket for the train to the conductor, who in turn surrenders the clearance ticket to the platform man at the respective stations on the New Jersey side, on receipt of which ticket the main line train is despatched.

MAINTENANCE CARDS.

Railway employees in all departments are often puzzled to know just how certain pieces of work should be done, and what degree of finish should be given in order that the best results may be obtained. Circular and other letters of instruction are not altogether satisfactory except as a correction for specific bad practice or some local defect. They are apt to be forgotten and contradicted, and a change of foreman or even of a workman may result in a change of method. The maintenance regulation cards that were described in a recent paper read before the Canadian Railway Club by R. W. Burnett, general master car builder of the Canadian Pacific Ry., furnish a pretty good solution of this problem, and are worthy of the careful consideration of foremen and officers who have to do with the maintenance of any kind of equipment.

These cards are so drawn up that they contain clear and concise information and instruction as to the methods to be followed in the performance of the specific piece of work to which they are devoted; and they now cover a wide range of subjects, though by no means complete. We quote Mr. Burnett as follows:

"The use of these cards has been developed by evolution. In the earlier stages they were used only to give direct instructions relative to standards, materials to be used (such as paint for the various classes of freight equipment), giving drawing

numbers, or such instructions as pressures to be used in mounting various sizes of wheels, etc. But, as the cards were issued, the possibilities of the scope for which they could be used became more and more apparent. In a short time cards were prepared giving in detail instructions covering certain subjects, containing drawing pattern, and form numbers, stating under what conditions betterments could be made, naming stations that would do the work, and the amount of work expected at various stations, in many cases saying what not to do and advising how report of work should be made.

"The method of preparing these cards varies. The usual procedure is to originate them in the general office, by making a preliminary draft of the proposed card, covering the subject as completely as possible, and giving copies to one or more members of the staff, or to foremen particularly interested, for criticisms and suggestions, after which all papers are turned over to one of the staff to compare with previous instructions and rewrite. The card is then given to the chief draftsman to be checked for accuracy as to drawing, pattern, and form numbers and dimensions. Copies are then sent to the heads of the departments interested, who in turn refer them to their staff for suggestions and criticisms. The card is then finally approved and proof-printed, proof is checked up, and necessary number printed. If necessary, extracts of the proposed card are sent out for the guidance of the foremen, pending the final approval and issuing of the card.

"The chief draftsman is asked to prepare cards which consist principally of data that would be furnished by the drawing-room. Various other members of the staff are called upon to make drafts of proposed cards on subjects with which they are in close touch. In some cases a local foreman may be asked to prepare a card on some practice that he has developed, or which has necessarily been carried on more largely at his station than at other points.

"Considering the manner in which these cards are prepared, which gives so many of the staff an opportunity to make suggestions and criticisms, it may be said that, to a large extent, foremen are carrying out their own instructions. We invite suggestions as to the subjects that should be covered by cards, and at divisional car foremen's meetings the drafts of the proposed cards are criticised and suggestions considered, also propositions are made as to the issuing of cards on subjects requiring definite instructions, sometimes accompanied by draft of proposed card. This combines the practical side of the subject, as seen by the men actually handling the work, with such necessary data and further instructions as may be furnished by the office.

"The cards are given the same index number used for correspondence. The index number of wheels, tires and trucks is 5, and the first card on any of these subjects would be 5-C. R. 1, and the second 5-C. R. 2. One card has been issued showing the index numbers and the subjects they cover. A card is issued quarterly showing the active cards, giving the index number of each, subject covered, issue number and date, by which all on the mailing list are enabled to check their file, and, should they be short of any, they are supplied upon request.

"An example of the cards is shown in that on methods of fumigation, the text of which is as follows:

14 C. R. 2.
CANADIAN PACIFIC RAILWAY
OFFICE OF THE MASTER CAR BUILDER | METHODS OF FUMIGATION
CAR REGULATION 14 C. R. 2. | "Thorough" & "Ordinary."
ISSUE NO. 2. APRIL 1, 1908.

THOROUGH FUMIGATION.

1. Fumigation should be done before the carpet or anything in car is removed, or cleaning is begun.
2. Close all outside doors, windows, deck sash and ventilators tight and pack all lamp jacks and similar jacks tightly with waste from the outside.
3. Open all interior doors and RAISE CLOSET SEATS. If car has dry hoppers stop up chutes at bottom.
4. Pull seats forward and loosen pillows in pillow boxes.
5. Open upper berth and lay headboards across the seats so that one corner rests upon a seat arm.
6. Lay lower mattress on the headboard with middle arched upwards, by placing the ends together.
7. Raise curtain poles and hang curtains near the ends by a single hook.

8. Throw blankets over curtain poles, making as few folds and thicknesses of cloth as possible.
9. Arch the upper mattresses in the berths.
10. Soiled linen in the lockers must be pulled out and scattered in passage.
- NOTE.—It is necessary to make the greatest possible surface exposure of the contents of the car, so as to insure the best results.
11. After car has been prepared for fumigation as above, place 3 galvanized iron pails per Dwg. No. 48961-6 in the aisle of the car, one in each end, and one in the middle. In each pail place 1-lb. of Permanganate of Potash and 1 pint of Formaldehyde.
12. After placing pails in position, cars must be closed and locked, and left for at least 3 hours, after which time thorough ventilation will be necessary. Pails should be removed soon after opening car to hasten ventilation.
- NOTE.—In ventilating the car, open all windows, and deck sash when weather will permit.
13. The ventilation usually requires about 3 hours before car is in condition to receive passengers.

ORDINARY FUMIGATION.

1. Make the car as nearly air-tight as possible by closing all deck sash, windows, ventilators and other openings.
2. Open all inside doors, berths and lockers and raise closet seats. If car has dry hoppers stop up chutes at the bottom.
3. Prepare Formaldehyde as in "thorough" fumigation, except that only 1 pail containing 1 lb. of Permanganate of Potash and 1 pint of Formaldehyde will be used, placing the pail in the aisle, in the center of the car.
4. Close and lock car, and leave closed for 1½ hours, or longer if time will permit, after which car should be ventilated as thoroughly and quickly as possible, the same as in "thorough" fumigation.

"Such assistant foremen, leading hands, and inspectors as do not have a place in which to keep a file of cards, not only have access to the regular office file, but it is insisted that they read the cards and familiarize themselves with up-to-date instructions.

"It is, of course necessary to occasionally revise the cards to take care of new developments, such as a change in shop practice or the alteration of drawings that would affect the subject covered. When this is done the card retains its index number, but is given a new issue number corresponding with the number of times it has been issued, and is also given the last date of issue. When a revised card is issued, the card which it supersedes is returned to the office.

"It is the intention to institute a system of examination of foremen and inspectors with regard to their familiarity with the cards covering their work. When a card is once issued it furnishes a foundation upon which any changes or alterations can be made with comparatively little work, and avoids the reconsideration of any subject as a whole.

"To a large extent, where explanatory correspondence was formerly used, where work had been neglected or information asked, it is only necessary to call attention to the card and insist on instructions being carried out.

"One thing that has been learned in the development of this system is that, before the preparation of a card is commenced, it is best to sub-divide a subject, covering sub-divisions by separate cards. As an instance of this, the card covering gas equipment, 28-C. R. 1, gives full catalogue reference as to lamps, class of cars in which used, and where used in car, also catalogue reference of parts liable to failure. 28-C. R. 2 gives instructions regarding cleaning and testing of gas equipment both at terminals and shop. 28-C. R. 3 gives instructions regarding gas mantles, showing catalogue reference, stating where large and small mantles are used, how and in which cars extra mantles will be carried, and method of applying new mantles.

"For electric train lighting equipment the cards are subdivided into instructions for shops, originating terminals, and intermediate terminals, as we wish the men at intermediate terminals to have a clear understanding as to the extent to which they should attempt to make repairs to a car in transit, with brief instructions as to how to locate cause of trouble and make repairs quickly.

"I will cite a few of the advantages we have found in using cards in place of circular letters. In the first place, they are prepared with more care and cover in detail all points of the subject referred to, while circular letters are more apt to be hastily prepared, and subsequent circular and other letters often give further instructions and modify or cancel

portions of former issues. This is often confusing to the persons receiving such letters, causes extra work checking with previous letters, and also necessitates great care to avoid issuing contradictory instructions. With the card system all obsolete instructions are canceled, but, when letters are depended upon, any prudent foreman can refer to some long-forgotten letter as authority for almost any practice that may be found at his station.

"Another advantage is that, when a card is to be prepared, it is found that there are many points in connection with the subject that have not received the necessary amount of attention. Frequently parts have not been maintained as they should be and could have been without extra expense, and inexpensive alterations can be made and betterments applied. For example, in considering the maintenance of doors and door fixtures, we find that a 3-in. stop secured in a certain manner is necessary in place of a 2-in. stop, that the brackets should be riveted on (a plain, inexpensive bracket can be used for all wooden cars), that the hasp should be secured with a wrought staple instead of malleable, and malleable wedge applied to doors of old cars in place of wooden. All these changes were found advisable on going into the subject thoroughly, in order to avoid as far as possible any after-thoughts that would make it necessary to change instructions, and that when repairs or alterations were made they would all be considered at once and be cheaply done.

"It might be said that this could have been done independently of the regulation card, which is, of course, true, but the fact remains that, had the work been ordered in the usual way, by circular letters, it is probable that first one item and then another would have been changed, and, in place of one clear, concise set of instructions on a single card, a series of letters would have been issued, which would have been far more difficult to follow up.

"Another advantage that has been found is that some devices, having a number of parts with in many cases no established name for each part, have to some extent been ordered complete to get one part, the heavier and more expensive pieces being held indefinitely in stock, where they have little better than scrap value, owing to their freedom from failure. To overcome this we have issued cards on the various devices or specialties, with full information as to what parts have proven liable to failure, instructions as to what should be ordered, pattern numbers, stating which parts are interchangeable, and other necessary information, and coining a name where necessary. On the back of the card is printed a photograph of the device, showing number and name of each piece, which has promptly enabled the foreman to obtain the parts which he had difficulty in procuring before, and prevented the purchase of parts not required.

"Another point of advantage in the card system, which also illustrates the disadvantages of depending on circular letters and blue prints, is found when an officer visits a station with limited time to check various subjects. He is often confronted by some subject on some points of which, on account of possible confusion, neither he nor the local man are entirely clear. They go to the office, and his time is consumed in looking over circular letters and correspondence pertaining to the subject, and drawing and pattern numbers, possibly having to follow the file through several years to determine what should be done on one subject, only to learn perhaps that a part of the instructions are missing, and at best having no assurance that the file is complete. His time should be used in looking at the actual work, assuring himself that proper shop practice is being followed, and that maintenance of equipment is promptly and economically conducted. Where maintenance cards are depended upon, the foreman would most likely be informed on the subject, and, if in doubt, a very few moments would locate the card and settle the matter.

In preparing these cards the difficulties often experienced by one of the staff most familiar with the subject—in sorting

out various instructions, eliminating obsolete and canceled instructions, filling in proper pattern, drawing, and form numbers, and dimensions and conditions under which certain instructions should be followed—have brought to us a realization of what we have been expecting of our foremen in the way of memory and office work, which expectations have not always been realized, or have been partially realized at the expense of proper supervision.

"By the use of this system it has been possible to have work done in a uniform manner at points separated by thousands of miles, which could not always be done when other means of issuing instructions were used."

ALL-STEEL BAGGAGE CARS FOR SUBWAY SERVICE.

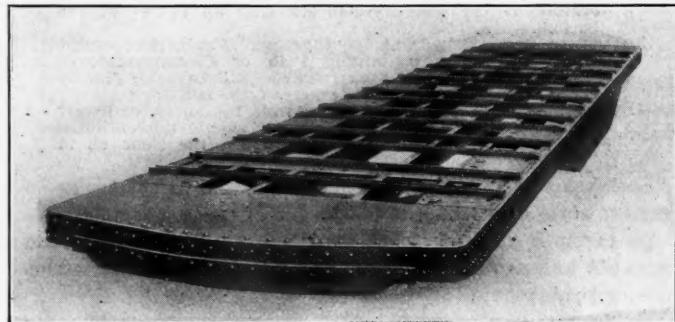
The Hudson & Manhattan Railroad Company, New York, recently received from The J. G. Brill Company two all-steel cars specially designed for the transportation of baggage between the several steam railway terminals which are served by the Hudson tunnel lines. Each car is arranged to receive at one time eight loaded baggage trucks, the plan being that the baggage should be transported on the trucks in order to eliminate all extra handling and trucking and to make it possible to upload a car with minimum delay. Each of the eight spaces between the side posts is provided with a folding apron on which are runways or guides, formed from steel plate, for the truck wheels. The runways on the apron are in line with depressions in the sheet steel floor of the car and thus a continuous guide or track for the truck wheels is provided by which a truck loaded with baggage may be quickly and easily pushed into position on the car from the loading platform. The aprons which take the place of the loose steel plates, frequently used by freight and baggage handlers to bridge the gap between the loading platform and car, are cleverly designed with levers and locking devices. The aprons themselves are part of a locking device for holding the baggage trucks on the car and are so designed that the air-brakes are kept set until the aprons are raised.

The locking device for holding the baggage trucks on the car consists of the apron, two guide levers and two swinging hooks at each end of each truck compartment. The guide levers act upon the swinging hooks in such a manner that when the apron is raised, the swing hooks are forced together and clamp the baggage trucks and secure them against any motion of the moving car.

The locking device for the platform aprons consists of a central handle with a bar extended to the flooring and having

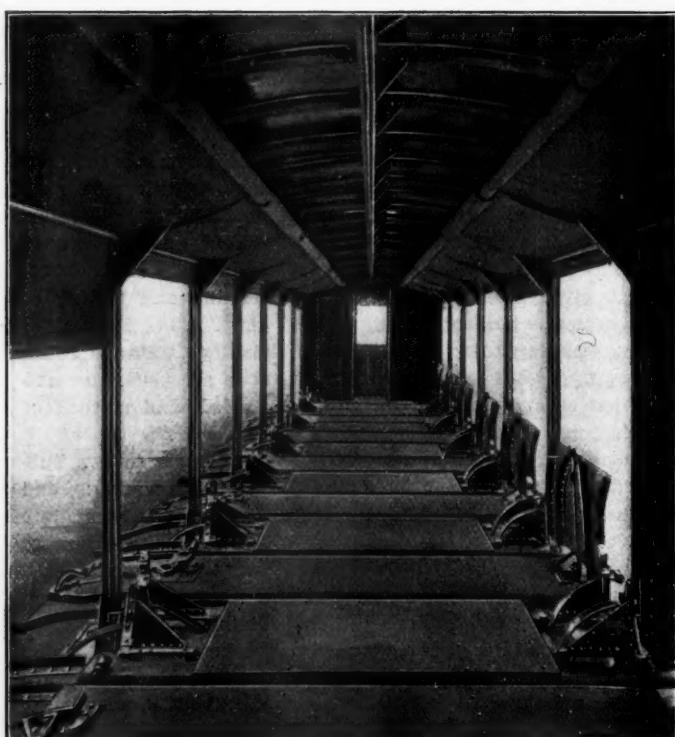
a foot and a hook formed at the end to brace the apron in the vertical position when the handle is turned. The handle hooks over the top of the apron plate in the upright position. The bottom end of this bar with the bracing foot and hook is also attached and hinged to a stem extending through the floor and braced by side sill clips. This stem is fitted through sockets to a valve stem which turns the valve in the train line open or closed and thus holds the brakes set whenever the aprons are lowered. The sides of the cars are enclosed by waterproof curtains which fit between each pair of side-posts. There is a motorman's compartment at both ends of the car.

The underframing comprises side sills of the fish-belly type, 22 in. deep at the center and 9 in. deep over trucks.

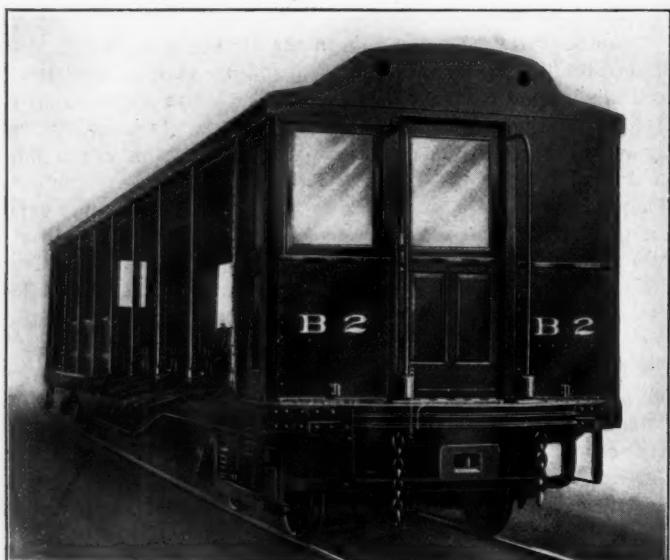


Underframe of All-Steel Baggage Car.

Each side sill is built up a $\frac{5}{16}$ -in. plate with $3\frac{1}{2}$ by 3 by $\frac{7}{16}$ -in. steel angles riveted at the top and the bottom. The center sills are 8-in. rolled steel channels (11.25 lb.). They are reinforced at the bolsters where the top flange is cut away by a 7-in. steel channel. The end sills are built up of $3\frac{1}{2}$ by $3\frac{1}{2}$ by $\frac{7}{16}$ -in. rolled steel angles with $\frac{1}{2}$ -in. front plates and are secured to the $\frac{1}{4}$ -in. telescoping floor plate. The bottom part of the end sill is also reinforced by a $\frac{1}{2}$ -in. pressed plate which forms a guide and support for the drawbar. There are two cross beams between the bolsters, built up of 6-in. steel channels. They are fastened to the side sills by strong knees



Baggage Car with Aprons Down for Loading on the Left Side.

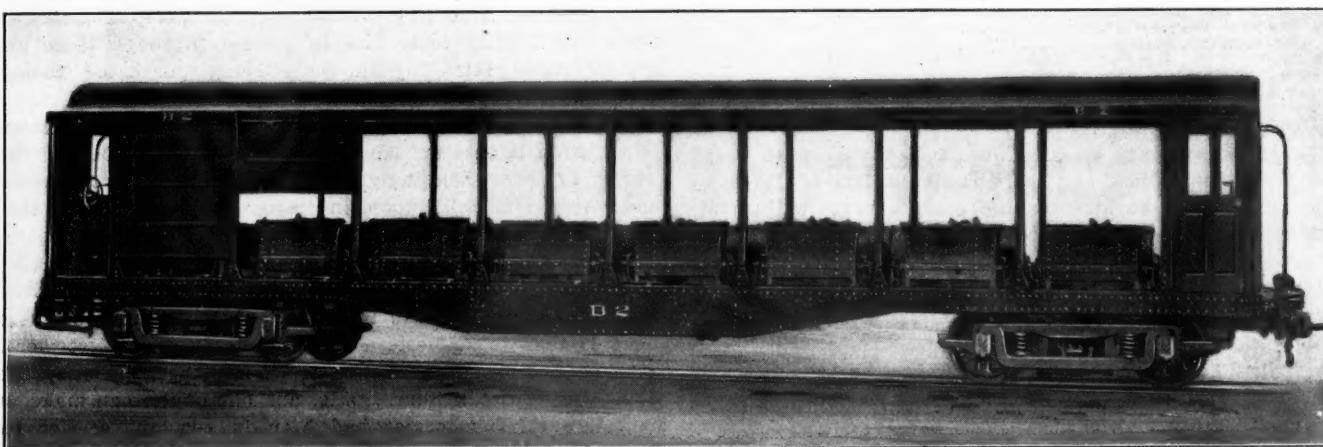


Baggage Car with Several of the Aprons Down.

and are supported and braced to the center sills with $\frac{1}{4}$ -in. gusset plates. The body bolsters consist of 9 by $\frac{3}{4}$ -in. wrought iron top members and 9 by 1-in. bottom members connected to the side sills by malleable iron fillers.

The body framing consists of $3\frac{1}{2}$ by 3-in., 8 lb. per ft.

placed in asylums. Six months pay was advanced to the families of the employees who had lost their lives. The whole railway system to the remotest corners of Italy suffered. Men and rolling stock were hurried down, 4,000 freight cars assigned for shelters of those who had lost their dwellings, and



All-Steel Baggage Car for Subway Service. Hudson & Manhattan Railroad.

T-section side posts. They are fastened to the side sills by $\frac{1}{4}$ -in. outside gusset plates and to the $\frac{1}{8}$ -in. floor plates by pressed pockets. The carlines, bent to conform to the contour of the roof, are $3\frac{1}{2}$ by 3-in. rolled T-sections, in line with each pair of side posts, and two $1\frac{1}{2}$ by $1\frac{1}{2}$ by $\frac{3}{16}$ -in. rolled angle carlines between each T-section. The T-sections are strongly braced to the T-posts by double gussets. The roof is constructed of $\frac{1}{8}$ -in. leaded steel plates riveted to the roof framing and made water-tight by soldering.

Following are a few of the principal dimensions of the cars:

Length over platform end sills	49 ft. 7 in.
Length over anti-chambers (bumpers)....	50 " 7 "
Distance between truck centers.....	34 " 6 "
Width over side sills	8 " 6 $\frac{3}{4}$ "
Height from top of rail to top of flooring.	3 " 9 $\frac{1}{2}$ "
Height from top of rail to top of roof....	11 " 8 $\frac{1}{2}$ "

The specifications and design of the cars were prepared under the direction of L. B. Stilwell, consulting engineer of the Hudson & Manhattan Railroad Company.

RAILWAYS IN MESSINA EARTHQUAKE.

The annual report of the Italian State Railways has a detailed account of the effect of the great earthquake at Messina and Reggio on the railways, and the measures that were taken to restore train service and provide, so far as possible, for the sufferers. From this it appears that if these places had not been accessible by sea, the suffering must have been much greater even than it actually was. The chief operating officer in Messina, Inspector Barbera (whose name deserves to be remembered), immediately after the shock sent out men to walk over the line westward towards Palermo and southward towards Catania and beyond, to ascertain whether trains could run over them. The line to Palermo was found impassable for some 14 miles; but the line to Catania, which passes immediately under Etna, was clear beyond the city, and it could be cleared sufficiently to despatch trains the very day of the shock, which was in the early morning. Trains were soon running, and by this route most of the inhabitants took flight. The dock walls of the train ferry slips had sunk and were distorted, and it was long before the boats could run. On the Reggio side of the straits both lines were impassable for long distances. Within the zone affected by the shock there were some 2,600 railway employees. Of these 476 were killed and many others were wounded, lost members of their families and their household goods. The minor orphans of railway men numbered 173, and of these 89 had lost both parents by the earthquake. These the railway management

such a diversion of forces made to carry supplies and materials to the suffering district that much ordinary traffic had to be declined and the business of the peninsula largely interrupted.

MACHINES AND TOOLS IN AUSTRO-HUNGARY.

The following extracts from the *Daily Consular and Trade Reports* are interesting indications of the extent to which American machine tools are used in foreign countries.

The Bohemia-Moravia Machine Works in Prague, Austro-Hungary, is one of the best in the Prague district. In all there are about 520 machine tools in service in the various shops, and of this number about 102 are of American make. The merits of American machine tools appear to be well understood at this plant, and the engineers are not only conversant regarding the American tools in use, but are well posted regarding the general run of American types.

During the past year a number of fine tools were purchased from the Niles-Bement-Pond Co., New York, at figures said to be considerably lower than continental quotations. The purchases include two heavy boring mills and one heavy lathe. The same firm has supplied additional lathes and also a steam hammer, which latter tools are seldom seen on the continent. The tool furnished by the Niles-Bement-Pond Co. is probably the best steam hammer in the Prague plant. As long as European prices can be met, there is no reason why hammers from the United States should not enter the European market to full advantage. Broadly speaking, the European prices can be met by American machine tool builders, and it is not necessary to go below prices prevailing in the United States. Directors of works, who are the buyers of machine tools in Europe, are known to be in a disposition to buy American machine tools at American prices.

The following is a list of the American tools in use in this plant:

Acme Machinery Co., Cleveland, Ohio.....	Screw cutters.
American Tool Works Co., Cincinnati, Ohio	Planers, radial drill.
Baker-Brainard Milling Machine Co., Hyde Park, Mass.	Vertical miller.
W. F. & J. Barnes Co., Rockford, Ill.	Vertical drill.
Bickford Drill & Tool Co., Cincinnati, O.	Radial boring mill.
Bradford Machine Tool Co., Cincinnati, O.	Lathes.
Bullard Machine Tool Co., Bridgeport, Conn.	Vertical boring mill.
Cincinnati Milling Machine Co., Cincinnati, O.	Universal milling machines.
Cincinnati Shaper Co., Cincinnati, Ohio	Double shaper.
Cleveland Automatic Machinery Co., Cleveland, Ohio	Automatic machine.
Flather & Co., Nassau, N. H.	Lathes.
Mark Flather Planer Co., Nassau, N. H.	Planers.
Gould & Eberhardt, Newark, N. J.	Gear cutters.

G. A. Gray Co., Cincinnati, Ohio.....Planers.
 Jones & Lamson Machine Co., Springfield, Vt. Turret lathe.
 Landis Tool Co., Waynesboro, Pa.....Grinders.
 Lodge & Shipley Mach. Tool Co., Cincinnati. Lathes.
 Niles-Bement-Pond Co., New York.....Vertical boring mills,
 lathes, horizontal miller
 and slotter and steam
 hammer.
 Wm. Powell Planer Co., Worcester, Mass....Planers.
 Pratt & Whitney Co., Hartford, Conn.....Turret lathes.
 Prentice Bros., Worcester, Mass.....Vertical drill.
 F. E. Reed Co., Worcester, Mass.....Lathes.
 Wm. Sellers & Co., Philadelphia.....Planer.
 J. E. Snyder & Co., Worcester, Mass.....Vertical drill
 Universal Machine Co., Providence, R. I....Grinders.
 Warner & Swasey Co., Cleveland, Ohio.....Nut facing machine, turret
 lathes.
 Whitcomb Mach. Tool Co., Worcester, Mass. Planer.

The present demand at the Bohemia-Moravia works is for good milling machines, and there is also a demand for good lathes. A strong machine planing bearing boxes with cross-head guides for locomotive work is at present needed.

The shops are driven by electric power, generated by steam turbines. One 900-k.w. turbine is at present installed and a new 3,000-k.w. turbine is being placed.

These works employ about 1,500 men. A day's work comprises nine hours, and a good mechanic at a machine will earn about 14½ cents per hour, or \$1.28 a day, but he must be a good man to make these wages.

The works of the Maschinenbau-Actiengesellschaft, Breitfeld, Danek & Co., Prague-Karolinenthal, Austria, are among the first engineering establishments in Bohemia at the present time. Two thousand men are employed in the Karolinenthal shops in Prague, although when business conditions are the best this number is greatly increased. The total number of men carried on the rolls of the company at the present time is 4,500, the 2,500 above the number engaged in Prague being scattered among the branch works in Aussig and Schlan, Bohemia, and Blansko, Moravia.

The business of this firm includes the manufacture of a varied line of engineering products, including mining plant equipment, installations for iron and steel works, blowing engines, steam engines of all types, gas engines and plants, steam and water turbines, ice-making and water works machinery, bridge building and general structural work, cranes, lifts, conveyors, steam, hydraulic, and pneumatic presses, pumping engines, boilers, sawmill machinery, cement-making machinery, flour-mill equipment, and railway signal and safety apparatus.

The following American machines are in service in this plant:

Acme Machinery Co., Cleveland, Ohio.....Bolt heading machines.
 Am. Tool Works Co., Cincinnati, Ohio.....Lathes.
 Baker Bros., Toledo, Ohio.....Vertical cutter.
 Baker-Brainard Milling Machine Co., Hyde Park, Mass.....Vertical millers.
 Bickford Drill & Tool Co., Cincinnati, O....Radial drills.
 Bullard Mach. Tool Co., Bridgeport, Conn....Vertical turret lathes and double boring mill.
 Cincinnati Milling Machine Co., Cincinnati, Ohio.....Milling & grinding machine
 Cleveland Automatic Machine Co., Cincinnati, Ohio.....Threading machines and automatic drills.
 Colburn Machine Tool Co., Franklin, Pa....Boring mill.
 Gisholt Machine Co., Madison, Wis.....Turret lathes and boring machines.
 Gleason Works, Rochester, N. Y.....Heavy bevel gear planer.
 Gould & Eberhardt, New York.....Gear cutter and grinder.
 Hendley Machine Co., Torrington, Conn.....Engine lathes.
 Jones & Lamson Machine Tool Co., Springfield, Vt.....Turret lathes.
 Kamps Mfg. Co., Milwaukee, Wis.....Milling machines.
 Landis Tool Co., Waynesboro, Pa.....Grinding machines.
 Lodge & Shipley Machine Tool Co., Cincinnati, Ohio.....Lathes.
 Morton Mfg. Co., Muskegon Heights, Mich....Shaper and vertical slotter.
 National Acme Mfg. Co., Cleveland, Ohio....Automatic machines.
 Stamp "C.F." New York.....Hor. metal saw cut.
 Warner & Swasey Co., Cleveland, Ohio.....Hor. turret lathes.

The Ringhoffer works in Prague, Bohemia, are engaged in the manufacture of a varied line of equipment, but by far the most important branch has to do with railway carriage building. All kinds of European type cars are built. In addition, the output embraces motor cars, tenders and snow plows. There are about 3,000 men employed in the car shop, while 5,200 men are necessary to operate all of the departments running full time.

A working day at the Ringhoffer works is nine hours, less

two pauses of one-half hour each. The best workman receives from \$1.22 to \$1.42 per day, and laborers from 61 to 81 cents per day. In the hammer shop foremen receive \$1.62 to \$2.03 per day, as do the foremen in other departments.

The machine tools in this plant are largely of American and German make. About 25 years ago nearly all the tools were obtained from English sources, and there are many of these old English tools now in service, although there are comparatively few English tools being purchased to-day. The Ringhoffer plant affords an object lesson of the situation in the machine tool trade at the present time. The main competition is between American and German tools, and the former are overwhelmingly favored. In comparing American and German machine tools in Europe, it is often said that the former are too light. This statement is not borne out in connection with this plant, where the foreman of the screw-making shop considers that his best tools are of American make and that they are not too light. His proof of these facts is that the American tool handles the heaviest work. A specific comparison of two tools, a planer, made by the G. A. Gray Co., Cincinnati, Ohio, and one of German make, is as follows: The former had been in constant service on heavy work for five years, maintaining the same accuracy as when first purchased; the German planer, notwithstanding its greater weight, possessed neither the strength nor the accuracy of the American machine.

The only fault to be found with American machine tools is in the matter of prices. Practically all purchases of American tools, it seems, at this plant were made through German sources; that is, the Bohemia works are largely compelled to apply to Germans to fill their requirements for American machine tools. American selling houses, it seems, have not yet attempted to enter this territory and offer machine tools as they would do in California or other distant states, and yet the Austrian territory has direct sea freight connection with the port of New York.

The following American machine tools are in use in the Ringhoffer shops:

Baker Bros., Toledo, Ohio.....Drilling machine.
 Baker-Brainard Milling Machine Co., Hyde Park, Mass.....Vertical miller.
 Garvin Machine Co., New York.....Shapers.
 G. A. Gray Co., Cincinnati, Ohio.....Planers.
 Gould & Eberhardt, Newark, N. J.....Shaper.
 Landis Tool Co., Waynesboro, Pa.....Grinder.
 Lodge & Shipley Machine Tool Co., Cincinnati, Ohio.....Lathes.
 Niles-Bement-Pond Co., New York.....Slotters, vertical boring machine.

The Austro-Hungarian State Railway Works, Vienna, is one of the oldest locomotive plants in Austria. It is said that there is only one other establishment in Austria which is equipped with greater percentage of up-to-date machine tools than the Vienna locomotive shop. This one exception is an automobile plant, and due to the peculiar character of the work, it can hardly be compared in all fairness with the locomotive works. Exclusive locomotive shops permit of the use of many varieties of tools of the rougher sort, and many of these tools are heavy. It is understood that a visitor to this plant is impressed with the great number of high-grade modern machine tools in use, which shows clearly that the directors of these works are alert to the advantage of getting the best lines of machines.

There are six No. 6 Brown & Sharpe grinders in this plant. Milling machines of this same make are also very much in evidence, as are a number of Gray planers and Pratt & Whitney tools. Probably a larger number of Sellers' planers are in service here than in any other shop in the Austrian territory. Other American machine tools in use here include a Bickford radial drill, Gisholt turret lathes, Gould & Eberhardt shapers, Pratt & Whitney millers, a Hilles & Jones punch and Brown & Sharpe planer grinders. It is understood that the purchase of Sellers' tools is made direct from America, and this fact seems significant, showing that a close

connection has been established in the relationship between the Vienna and Philadelphia firm. Portable electric drills are used to a considerable extent, but there are no pneumatic tools in service.

VALUE OF A UNION FREIGHT TERMINAL ORGANIZATION.

A union passenger station is a detriment to a city, but a union freight terminal railway is a benefit. Where there is a union passenger station many passengers travel straight through without spending any time or money, which is a loss to the city. Union freight terminals, on the other hand, afford cheaper switching to the merchants of the city, and their goods can be delivered more promptly. A railway covering all switching zones can do the switching more quickly and more cheaply than where these zones are the yards of different railways.

A trunk line naturally gives more consideration to road business than to strictly switch business. They are interested in getting their outbound long haul stuff lined up and away on time, and long haul inbound freight delivered to connections or placed at unloading points; much more interested than in handling of a loaded car for an industry on their rails given them by a connecting line; one to be handled a short distance for a small switching charge.

A switching railway has every incentive to handle all cars in turn and quickly. It is a specialist, and its specialty is local switching service. The entire organization from the president down is right on the ground and in close touch with the people and the situation at all times. Immediate supervision is constant, and supervision pays the highest rate of interest, especially in crowded terminals where there are many complexities and a great amount of business to be done in limited space. Trunk lines having terminals in cities of the first class should have terminal superintendents. By watchfulness capable officers can save their salaries many times over every day.

A union terminal railway need not own cars. Since nearly every car it handles is under per diem, all cars must be hurried, only from two to six days being allowed to get them placed, unloaded and returned empty to the delivering line. If a switching line does not handle cars promptly, all the profit of the switching service is lost in payment of per diem to the owners of the cars. The majority of cars on a trunk line are its own, and the men are not forced to hustle to escape the 25 cents a day.

Many industries complain that their shipments are bunched. A union terminal railway avoids this to a large extent by systematic switching; handling cars in rotation. The records of any union terminal railway compared with trunk line terminals, in the same section of the country, will show that there is less bunching and more prompt movement by the switching line.

A union terminal railway, being able to handle carloads to destination quickly and cheaply, pleases shippers and receivers and promotes the growth of the city. Good service is the surest guarantee that a railway will increase its usefulness and its revenue. It is fast getting to a point where good service is the best advertisement of a railway.

Where movements are made quickly there are few stray cars, fewer mistakes and less liability of theft, and men work better. Activity is contagious. Where a set of men are ahead of their work or right up with it all the time, whether in an office or shifting freight cars in the yard, they work more quickly and with a better spirit than when snowed under.

A union terminal company may be looked upon as the fountain head of the different railways branching out from a city. Such a corporation can better deal with the people. It is more likely to expand and keep its facilities ahead of the needs;

has more power with the community and can get necessary concessions from municipal officers more readily than they can be got by individual railways working independently. City officers will recognize the benefits of a union terminal as compared with independent terminals.

Demurrage is an important question. As the ground in cities becomes more valuable the dollar a day paid as demurrage will not compensate owners for conversion of cars into warehouses, and this eventually will bring about graduated demurrage, as it already has done in several large cities. This graduated demurrage can more easily be assessed by a union terminal company. Trunk lines are timid about applying it for fear of driving business to competing lines. Railways using the sliding scale are now charging \$1 for the first, \$2 for the second, \$3 for the third and \$4 for the fourth, 24 hours after free time. The probabilities are that, in the near future, at congested city yards, \$4 or \$5 will be made the maximum demurrage charge in order that owners may get the proper use of their cars. When business is heavy a car is worth \$8 a day, and the practice of consignors and consignees using freight cars as warehouses must stop.

A railway doing switching exclusively must expand its facilities and organization, and must keep ahead of the switching necessities in the city. It must figure to what extent it has to increase facilities to take care of the business next year. It keeps engines and tracks in first class condition, promoting prompt handling of business. The officials know that unless they do handle business properly the newspapers and business men will raise an uproar, and one that they cannot pacify except by improved service.

While a union freight terminal is the best for the prosperity of the city there must be no standing in the way of terminal developments of all kinds. Development of railway terminals must be encouraged and fostered; terminals must be enlarged, and for the benefit of all concerned; enlarged in time to take care of the business; extended before retardation affects the situation.

REVISION OF OAK PARK ELEVATED AT ENTRANCE TO NEW NORTH WESTERN TERMINAL, CHICAGO.

The approach to the new passenger terminal which the Chicago & North Western is building in Chicago passes under the Chicago & Oak Park Elevated structure (formerly the Lake Street Elevated) between Canal and Clinton streets. As this approach is elevated, it necessitated raising the elevated railway structure to give the necessary clearance for the railway trains. A plan and profile of this change of grade is shown herewith in Fig. 1. It extends from the west side of the Chicago river to Union street, 2,100 ft., and the maximum raise was 6 ft. Where the elevated structure crosses the railway tracks the regular column and girder construction of the former was replaced by a 155-ft. truss span.

In raising the structure work was begun at the west end of the stretch to be lifted. The elevated structure is of the type having columns at the curb line supporting transverse plate girders. Between cross girders are four lines of track stringers. The former are 45-ft. span and the latter vary from 30 to 50 ft. Before raising, longer knee braces were put in between columns and cross girders to give the necessary rigidity. The lifting was done by A-frames under the cross girders, bolted to the columns and having their bases resting on blocking at each end. The greatest lift given any bent at one time was 2 in. When the desired height was reached and the jacks taken out, the column shoes were removed and base pieces or extensions riveted to the old columns after putting in new concrete column foundations. The columns were then lowered the slight amount necessary to land them on the pedestals.

Preparatory to putting in the truss span over the railway tracks, the elevated tracks were detoured on falsework to the

north and south of their respective normal locations, as shown in the photograph, Fig. 2. The 155-ft. span, consisting of three trusses, is carried at each end by a box girder 10 ft. deep, back to back of angles, which is supported by a column on each curb. Each column rests on a foundation pier 10 ft. in diameter

which was carried to hard-pan and there belled out to 16 ft. in diameter. Suitable bracing between the curb line columns and the adjacent columns of the elevated structure was provided by latticed struts 18 ft. $7\frac{3}{4}$ in. deep. The old stringers were remodeled for use in these panels, and their ends

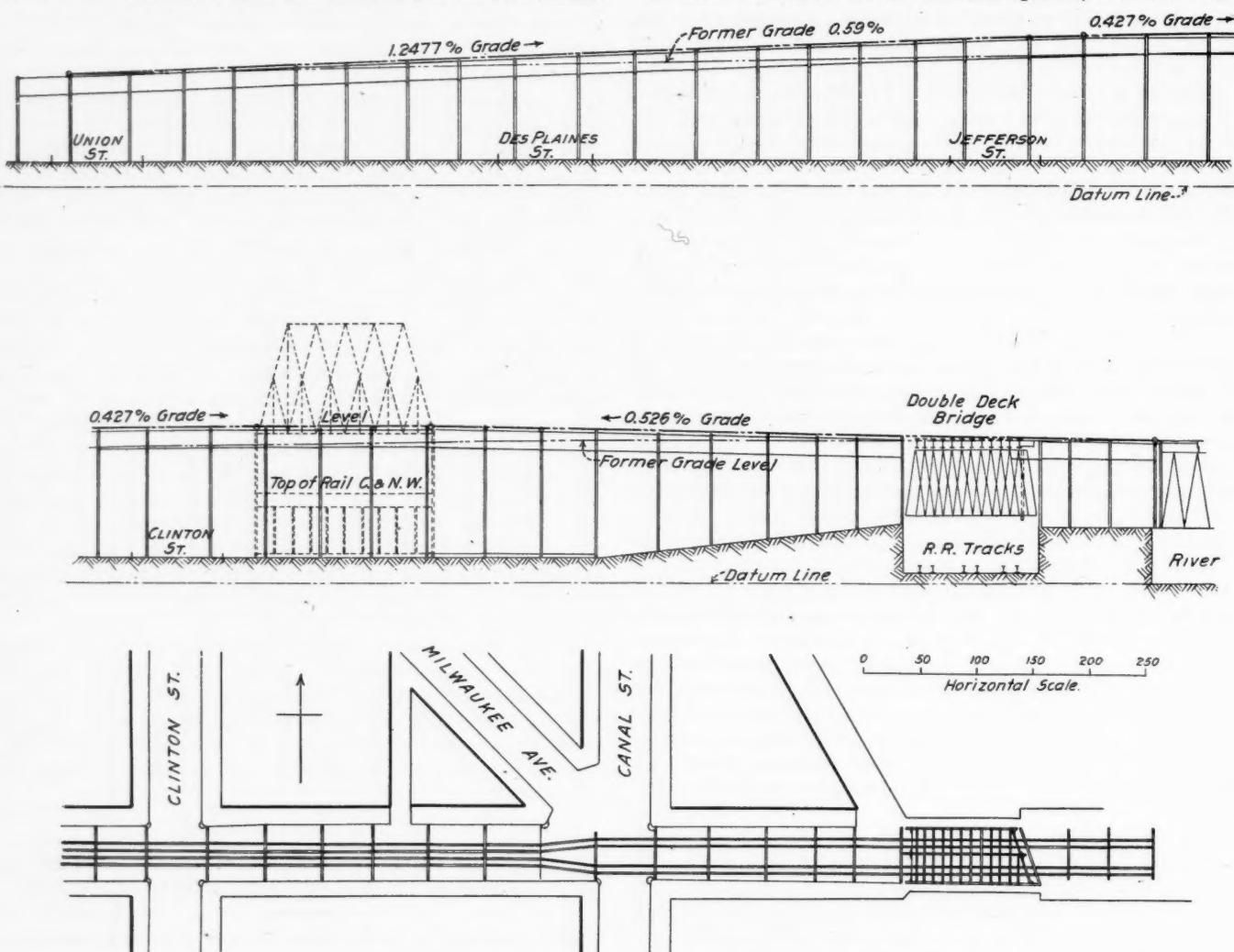


Fig. 1—Plan and Profile of Grade Change of Oak Park Elevated.



Fig. 2—Elevated Railway Detoured on Falsework.

adjacent to the abutment girders given suitable horizontal bracing.

The 155-ft. through riveted lattice truss span is designed for four tracks, to provide for the two additional future tracks the elevated road expects to put in. The extremely stiff bottom chords of the span were made straight and the necessary

bolt heads have the greater dimension longitudinal, and the bolts were given a quarter turn after insertion. The shank of the bolt is square, and when the clip was set down over it it was effectually locked in position. The method for providing cavities for the bolt heads in the concrete under the channel is shown in the details. A piece of 3-in. gas pipe, $1\frac{1}{4}$ in. long, was

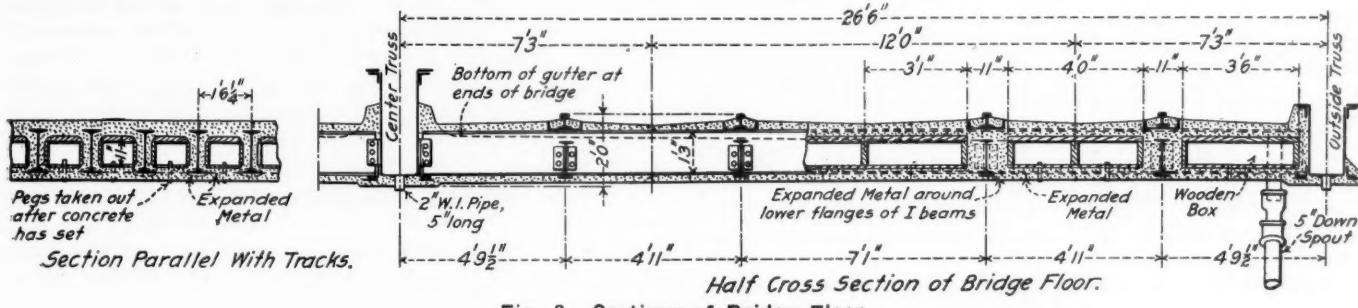


Fig. 3—Sections of Bridge Floor.

camber put in during erection. This camber conforms to a vertical curve uniting the 0.5 per cent. grades of the track at each end, which are thus rounded off in the span. No trouble was experienced in imparting this considerable camber to the chords in the way mentioned.

The floor construction is the novel feature of this span. The floor beams are 15-in., 60-lb. I-beams spaced $18\frac{1}{4}$ in. on centers. Under each rail, between floor beams, except the two at each end, are diaphragms cut from 12-in., 31.5-lb. I-beams,

having their bottoms flush with those of the floor beams. A bottom plate under each row of diaphragms, extending the length of the row, gives them continuity and brings more floor beams into action at one time.

The floor members of the span are incased in concrete to protect them from the locomotive gases, as shown in the half cross-section of the bridge floor, Fig. 3. To minimize weight wooden boxes were put in the spaces bounded by diaphragms and floor beams. Openings from these boxes through the bottom course of concrete for draining off water which might collect in the boxes while concreting were provided by attaching square pegs to the bottom forms, which pulled out when the forms were removed. The boxes were put in place without their tops, and these were nailed on after concrete had been put around the

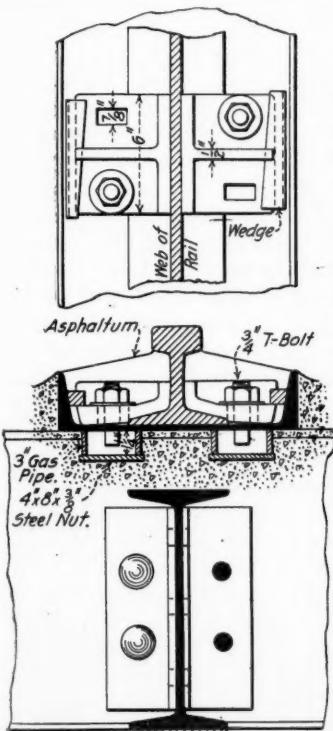


Fig. 4—Details of Rail Fastening.

boxes to hold them in place. A torpedo sand concrete was used, being made thin enough to pour.

The transverse grading of the top surface for drainage is shown in the cross-section. The camber gives the necessary drop each way from the center for longitudinal drainage, and across each end, between the first and second floor beams, is a gutter leading to a downspout at each column.

The rails are laid in 12-in., 25-lb. channels riveted to the floor beams. The method for fastening the rails is ingenious. As shown by the detailed view, Fig. 4, they are held by cast-iron clips secured by T-bolts passing through the web of the channel. The holes in the channel webs for the passage of the

fastened under the opening by a 4-in. x 8-in. x $\frac{3}{8}$ -in. steel plate on the under side, into which a short $\frac{3}{4}$ -in. bolt was screwed from above. When the concrete had set the bolt was removed. The clip has a transverse central rib, and at the outer end of the latter is an opening for driving a wedge between clip and channel flange. When all fastenings were made secure, asphaltum was poured around the rail in the channel.

The half cross-section of the bridge floor shows the drains from the bottom chords through the concrete under-surface. These are 5-in. lengths of 2-in. pipe, having a flange screwed on to the upper end to hold them in the concrete. These drains are put in midway between the diaphragms of the chords. The abutment box girders are designed to allow a man to get inside at either end to inspect and paint them. The bottom cover plates stop 6 ft. from the column, giving ample space for entrance, and the intermediate diaphragms extend down only 17 in. from the top. The distance between girder webs is $20\frac{1}{8}$ in.

The elevated structure for the North Western's tracks follows the standard for the track elevation bridges of the road, which have already been described in these columns.

All of the work was done at the expense of the Chicago & North Western, including the removal of the station of the elevated railway at Canal street and building a new station at Clinton street. The steel work follows the North Western's standards, while the new elevated station conforms to the standard design of the elevated railway. The work was done under the direction of E. C. Carter, chief engineer of the North Western, and W. C. Armstrong, terminal engineer, by George W. Jackson, Inc., Chicago, who also built the extensions for the columns of the elevated structure, and the steel work for the new station at Clinton street. The remainder of the steel work was fabricated by the Pennsylvania Steel Co., Steelton Pa.

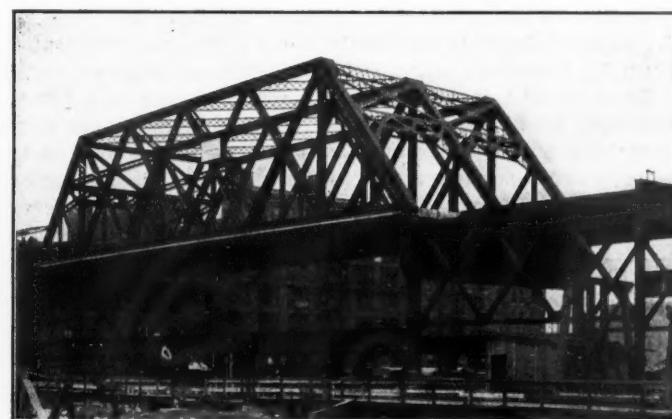


Fig. 5—Completed Span; Bridge for Steam Railway Tracks Below.

THE PRIVATE FREIGHT CAR AND DEMURRAGE.

BY ARTHUR HALE.

II.

The article in the *Railway Age Gazette* Aug. 27, 1909, should be revised in line with the national demurrage rules, and the decisions of the Supreme Court handed down on January 10, especially the Illinois Central and Pitcairn cases.

These decisions give the Interstate Commerce Commission the sole right to say whether or not certain practices are forbidden by the Hepburn Act as involving "undue or unreasonable prejudice or advantage." It is, therefore, clear that the commission may legally forbid railways to exempt private cars from demurrage, if, in the opinion of the commission, such exemption would give car owners an undue and unreasonable preference or advantage over others.

The commission had already issued an order on the subject, as noted in the article referred to, but this order it has practically annulled by approving the national demurrage rules, which provide an entirely new solution for the matter, and it is understood that in the next tariff bulletin the commission will amend its administrative rulings based on the old order.

A minor point, which may be noted in the first place, is that the commission has withdrawn its definition of "privately owned car." This definition was not in line with the American Railway Association's definition of a "private car" as being "a car of other than railway ownership," a definition which therefore stands, one element of confusion being eliminated.

The *Railway Age Gazette* article above referred to was an argument in favor of the charging of demurrage on private cars exactly as it is charged on railway cars, with one exception, which seemed so obvious that no detailed argument was made in its favor. The cars to be excepted from demurrage were private cars on the tracks of their owners.

The national demurrage rules go farther than this. They provide that private cars should be subject to demurrage "while in railroad service" to the same extent as railways' cars. An explanation of the circumstances under which private cars are in railway service follows.* And under this explanation are developed many cases where owners of private cars are expected to pay demurrage, even when their own cars are on their own tracks.

Although, at the hearing on the subject of these demurrage rules, there was no objection to this exemption of private cars on tracks of their owners, the railways are accepting the national rules without change, including, as they do, this provision for the charging of private car owners demurrage on their own cars on their own tracks. The rules have been adopted by the American Railway Association. They have been approved by a large majority of the demurrage bureaus in the country and will go into general effect in interstate commerce in some states on March 1, and in others on April 1. Some of the railway commissioners have also promulgated them for immediate adoption in intrastate car business.

To a layman it seems that this private car rule comes perilously near confiscation of private property. Certain shippers have built private cars solely because they desired to store their freight in cars, or to take their time in loading or unloading their own cars on their own tracks unhampered by demurrage rules, and some of the private car owners are

*Private cars while in railway service, whether on carrier's or private tracks, are subject to these demurrage rules to the same extent as cars of railway ownership.

(Empty private cars are in railway service from the time they are placed by the carrier for loading or tendered for loading on the orders of a shipper. Private cars under lading are in railway service until the lading is removed and cars are regularly released. Cars which belong to an industry performing its own switching service are in railway service from the time they are placed by the industry upon designated interchange tracks and thereby tendered to the carrier for movement. If such cars are subsequently returned empty they are out of service when withdrawn by the industry from the interchange; if returned under load, railway service is not at an end until the lading is duly removed.)

resisting this rule on constitutional grounds. Other private car owners of equal importance are accepting the rules and arranging to work under them.

The resistance of the private car owners has so far been confined to representations to the various state commissions, which are considering the adoption of these rules in intrastate traffic. It is quite possible that when rules go actually into effect the car owners may institute proceedings before the Interstate Commerce Commission and the courts.

The defence of the new rule, as given in the report of the committee of the national railroad association and in other correspondence, is simply that to relieve a private car owner of the payment of demurrage on his own car, on his own tracks, is an undue and unreasonable preference or advantage over the shipper, who under similar circumstances is obliged to pay demurrage on cars which he does not own or which are located on tracks which he does not own. This discrimination the commission feels is sufficient to justify an order that demurrage rules apply in all cases.

Under the decisions of the Supreme Court alluded to above, there is no doubt that the individual car owners will have to make their appeal first to the Interstate Commerce Commission, and in view of the commission's approval of these rules there seems to be no doubt that their decision will be against them. This decision can, however, be appealed to the federal courts.

A careful reading of the Supreme Court's decision would seem to confirm the view that the courts will only take constitutional questions into consideration and if it is urged that the charging of demurrage on private car on track of the owner amounts to a confiscation, it is quite evident that the Interstate Commerce Commission will reply that the mileage paid for the car is in lieu of all the rights and privileges of the car owner and no exemption from any of the rules of the carriers applying to him as shipper or consignee will be allowed. Whether or not this view will be sustained by the court is, of course, a question, but the position of the carriers in this matter is very similar to their position in the Pitcairn and Illinois Central cases when they urged that the handling of their own fuel was not commerce and that, therefore, they could use their own cars for their own fuel coal without interference by the Interstate Commerce Commission. As already noted in your columns, the Supreme Court brushed this contention aside with the simple statement that coal cars of the carriers were instrumentalities of commerce and were, therefore, under the law. It seems quite probable that the courts will decide that private cars when in railway service are instrumentalities of commerce just as the railway coal cars are, and are equally subject to the law.

Arguments against the wisdom of the decision will not avail, for the Supreme Court makes it very clear that the courts can only pass on the legality of the commission's orders and not on their wisdom. Indeed, the Supreme Court makes it very plain that in questions of great complexity, like this, an order of the commission is likely to create some "inequality," and for all that may be legal. Under the circumstances, it seems probable that the rule will stand.

There is something almost comic in the idea that an order intended "to prevent undue advantage," or as it is very commonly called, discrimination, can legally create anything like "inequality," but due reflection convinces one that the point is well taken and that this is only another case where the least of evils must be chosen.

To quote the Supreme Court again, it will probably be found that the private car owners in objecting to the rule in question "but assail the wisdom of Congress in conferring upon the commission the power which has been lodged in that body to consider complaints as to violations of the statute and to correct them if found to exist, or attack as crude or inexpedient the action of the commission in performance of the administrative functions vested in it."

General News Section.

Newspapers in the West say that the Western Pacific is to be opened for passenger traffic on June 1.

A press despatch from Indianapolis says that the Southern Indiana is to abandon its shops at Bedford and establish shops at Jasonville.

During the strike of street railway men in Philadelphia the Pennsylvania Railroad had in and near that city 200 members of its police force.

At the Greenwich piers of the Pennsylvania Railroad at Philadelphia, last week, a steamship was loaded with 5,268 tons of coal in six hours.

Thomas King, representative of the Boilermakers' Brotherhood, says that the New York Central has agreed to increase the pay of boilermakers and their helpers.

It is announced in Minneapolis that the Minneapolis, St. Paul & Sault Ste. Marie, which is controlled by the Canadian Pacific, will this year adopt a pension plan for its employees similar to that of the C. P.

Prince Rupert, the new town at the Pacific coast terminus of the Grand Trunk Pacific, now boasts a population of 4,000. The railway company will this season develop a fertile fruit district about 100 miles east of Prince Rupert.

The mechanics in the shops of the Chicago, Indiana & Louisville, at Lafayette, Ind., have had their pay increased about two cents an hour, and the whole number of men benefited, including laborers, receiving a smaller advance, is 600.

During the strike of street railway employees in Philadelphia last week the Philadelphia & Reading carried about 90,000 additional passengers each day, nearly all on short journeys within the city limits. The average increase in receipts is given as \$7,200 a day.

A press despatch from Winnipeg says that railway employees throughout western Canada are demanding an increase of 25 per cent. in their wages. It is said that unless the increases are granted just as they stand, the employees will appeal to the government for arbitration under the Lemieux act.

A bill has been introduced in the New York legislature to provide for the appointment of a barge canal traffic commission of five members to fix, for the barge canal, a tariff of rates to govern traffic when the canal shall be opened, and to see that canal carriage is not unduly monopolized.

Electric traction on the Harlem division of the New York Central was this week extended from Wakefield northward about 10 miles to North White Plains, and the electric locomotives will now run through between North White Plains and the Grand Central station, New York City, 24 miles.

The local transportation committee of the Chicago council has sent a circular letter to officers of 26 Chicago railways asking 150 questions about electrification of terminals. These questions relate to the extent of the use of coal, coke, oil, gasoline and electricity as motive power and the results got from them. The issuance of this circular letter is taken to be a renewal of the city's agitation for the suppression of the locomotive smoke nuisance.

From the statistics gathered by the Interstate Commerce Commission for the year ended June 30, 1908, it has been found that in that year 62 per cent. of the total operating expenses of the railways of the country was paid out for labor, as compared with 61.3 per cent. in 1907 and 60.5 per cent. in 1902. This increased proportion went to the employees in 1908 notwithstanding a decrease of 7.5 per cent. in gross operating revenue as compared with 1907.

The through train service between Odgen, Utah and Oakland, Cal., over the Southern Pacific was restored March 11 after an interruption of 10 days or more by reason of floods in Nevada. Serious damage was done to the roadbed over a distance or more than 60 miles. The worst damage was in the Humboldt valley. The Western Pacific, which has been

open for freight business for several months, also suffered severely, the roadbed being completely destroyed for many miles.

The Santa Fe System is now using telephones for train despatching between Denver and Pueblo, Colorado, 120 miles, making approximately 1,950 miles of the Santa Fe lines now thus equipped. There are forty telephone stations on this 120 miles, Western Electric telephones and Gill selectors being used. There are about 30 trains a day and 75 regular meeting points. This division is used jointly by the Santa Fe and the Colorado & Southern, the despatching being all done from Pueblo by the Santa Fe.

The benefits paid out by the relief fund of the Lehigh Valley Railroad during the year 1909 amounted to \$85,689, and there was left a balance in the treasury of \$28,100. A recent newspaper item says that the fund was established in 1878, and that in its 32 years of existence the contributions have amounted to \$1,485,793, of which sum one-half was paid by the railway company; and it is said that this is the only instance in the United States where the railway company pays half of the relief benefits. Of the 21,505 persons employed by the company last year, 7,346 were subscribers to the relief fund. Subscriptions are called for whenever the condition of the fund may demand.

Robert J. Bailey, secretary of the Individual Car Owners' Association, in a letter approved by the executive committee of the association, has asked the Interstate Commerce Commission to decide what would be a just and equitable rate to be paid by the railways to the owners of private cars of different kinds; what should be paid for such cars when they are diverted from "the use of their owners" for the public use without the knowledge, consent or desire of the owner; and to what extent the owner of a private car should be liable for bills for repairs of such cars when they left his hands in perfect condition. Mr. Bailey says that for two years he has been trying unsuccessfully to get answers from these questions from the railway associations. Lately he has been before the Pennsylvania State Railroad Commission, but that body sends him to the Interstate Commerce Commission.

St. Louis newspapers say that the appointive members of the Municipal Bridge & Terminals Commission of St. Louis probably will resign in a body. Mayor Kreismann is quoted as having stated that they offered to resign a short time ago, and only retained their offices at his urgent request. This commission was appointed in 1905 to solve the terminal problem at St. Louis. It employed Albert T. Perkins and Robert Moore as expert advisers in regard to railway traffic, operating and engineering matters and took up with the railways various questions relating to readjustments of rates between the city and the East and physical improvements of the terminals in the city. It secured various reductions in rates to the East, reached an understanding with the railways regarding improvements that were to be made in the terminals and sought to get the city to pass ordinances which would enable the roads to carry out their plans. The council having rejected the ordinances which the commission drew and submitted, its members feel that they no longer have any standing as the representatives of the city, and, therefore, will no longer have any influence with the railways and that, in consequence, the commission has outlived its usefulness. The mayor and board of public improvements are ex-officio members and the appointive members are seven of the leading business men of St. Louis. The St. Louis house of delegates has passed a resolution asking the mayor to seek conferences with the presidents of the various St. Louis railways with a view to securing the abolition of the bridge arbitraries within the 100-mile district.

The committee on railway mail pay, Julius Kruttschnitt, chairman, whose argument was printed in the *Railway Age Gazette* February 25, page 396, calls attention to the erroneous deduction made by many persons from language used in the special message of the president, December 7, 1909: "The

annual cost of the *transportation of this matter* is more than 9 cents a pound." * * * The report of the Postmaster-General shows that the rate named is erroneous. He says (page 8): "The cost to the government for its *handling* and *transportation* averages 9.23 cents a pound," and on page 32 he states that this figure includes "transportation, handling, administration and all items in connection with the operation of the postal establishment." It appears that in the weighing of 1907 the packages constituted 43.09 per cent. of the total weight carried, the mail itself constituting 56.91 per cent.; in other words, for every pound of actual mail carried, the department for its own use and convenience requires the roads to carry three-fourths of a pound of additional weight. The report of the Postmaster-General (page 29) gives the following figures of cost:

	Per pound mail matter.	Per pound of mail and equipment.
Payments to railways for transportation..	2.88 cts.	1.65 cts.
Do., for railway post office car service.*... .	.31 "	.18 "
Total payments to railways.....	3.19 cts.	1.83 cts.
Transportation other than payments to r'y's	.84 cts.	.48 cts.
Railway mail service (salaries clerks, etc.)	.57 "	.32 "
Rural delivery service	1.74 "	1.00 "
Salaries postmasters, clerks, carriers, etc...	2.71 "	1.55 "
Other expenses directly assignable.....	.03 "	.02 "
Other expenses not directly assignable.....	.15 "	.08 "
Total expenditures	9.23 cts.	5.28 cts.

*Namely, compensation for hauling a fully equipped post office in a moving passenger train.

Therefore, the railways receive for the transportation of second-class mail and equipment used by the department to contain it, not over 9 cents a pound, but only 1.65 cents a pound.

Negotiations Concerning Wages.

The leaders of the Firemen's Brotherhood, in session at Chicago, voted last Monday to order a strike on 47 of the principal railways west of Chicago, employing about 25,000 firemen; the reason given for striking being that the committee of managers, representing the railways, had refused to submit to arbitration any of the questions at issue between the companies and the employees, except that of wages; but on Tuesday it was decided to wait until Messrs. Knapp and Neill could be brought from Washington to attempt a settlement of differences. The Brotherhood committee consisted of President W. S. Carter and 47 representatives, one from each of the 47 roads. The date specified in their strike resolution was not given out, but the reporters say it was Monday, March 21. The appeal to Washington was made by the railway managers. Messrs. Neill and Knapp at once telegraphed to Mr. Carter and received from him the following reply:

Matters in controversy involve conditions of employment and increase in wages. Committee preparing to leave city, but if assurance is given that mediation will begin immediately and in the city of Chicago, authority for the men to leave the service of the companies will be temporarily withheld. The fact that we have proposed arbitration on all matters in controversy and the fact that the managers' committee have rejected our proposition does not lead our men to expect a settlement from mediation but as evidence of our fairness will accept your friendly offices under the conditions named herein.

At the same time Mr. Carter wrote to the managers insisting that the only parties concerned in the dispute are the railways, the public and the employees represented by his committee. This evidently is meant as a denial of the managers' claim that the present dispute is affected seriously by what the roads would have to do with other employees if increases or concessions are granted to firemen. Mr. Carter told the reporters that Messrs. Knapp and Neill were coming, not to arbitrate but to determine what should be arbitrated. The railways had all along expressed willingness to arbitrate wages, but refused to arbitrate the question of the right of the firemen's brotherhood to represent a fireman who has been promoted to engineman, or questions of seniority. The proposed schedules of wages, made up by the brotherhoods, are said by them to call for increases of 12½ per cent., but representatives of the railways say that 22 per cent. would be more nearly correct.

Mr. Carter tells the reporters that, in asking the railways to negotiate with his brotherhood concerning wages or conditions

of employment of enginemen, he is asking no more than the railways have granted in the case of conductors and brakemen. In these services, as well as in engine service, men promoted from a lower to a higher place still retain their membership in the brotherhood of the lower position.

Press despatches from New Haven, Conn., March 15, say that the brotherhood leaders of the conductors and trainmen of the New York, New Haven & Hartford have got out of patience waiting for a satisfactory offer from General Manager Higgins, and have asked the employees of both brotherhoods throughout the lines of the company to vote this week on the question of authorizing a strike.

Officers of the Baltimore & Ohio and of the conductors' and trainmen's unions announced in Baltimore last Saturday that the principal questions at issue between the road and its employees concerning wages and conditions of employment had been compromised, and that a serious strike had been averted. The government mediators, Messrs. Knapp and Neill, had held protracted conferences with both sides, and there was a long, final conference of the three parties together. The terms of the agreement were not given out, and some of the questions, particularly that concerning the demand of the employees that the road should not run two engines on a train, are left for further discussion and probably arbitration. It is said that both sides will consult interests connected with other roads before a decision shall be reached on this point. The leaders of the employees said that there would be a substantial increase in pay to the conductors and trainmen in the passenger, freight and yard service.

Electric Locomotives on the Baltimore & Ohio.

Two electric locomotives have recently been added to the equipment of the Baltimore & Ohio for operation through the tunnel at Baltimore. These are designed for either freight or passenger trains and are of a somewhat different design from the older types. In general the new type has a flexible wheel base consisting of two trucks coupled together and surmounted by a platform carrying a steel cab and extending the entire length of the locomotive. The two trucks are permanently linked together with heavy connections and carry the draft gear and bumper on the outer end frames. With this construction all hauling and pushing stresses are transmitted through the truck framing on approximately the same horizontal line and are not carried through the center pin into the platform framing. The principle embodied in this type of locomotive construction is not new but is one whose success has been demonstrated by its practical application to steam locomotives for a number of years. The Baltimore & Ohio Mallet compound locomotive resembles the new electric type in this respect.

Apparatus for controlling the locomotive is mounted on the platform and enclosed in the cab. This cab is divided into two parts, a main operating cab occupying the center part of platform and low auxiliary cabs extending from the main operating cab to the outer ends of the locomotive. The end cab contains such parts of the control apparatus as do not require continuous inspection and care. The new electric locomotive weighs 90 tons on drivers. The weight on the drivers of a Pacific type steam locomotive for heavy passenger service very rarely exceeds 75 tons. A weight of 90 to 100 tons on drivers is only obtainable on freight locomotives of the consolidation and Mikado types.

In the steam locomotive, on account of boiler limitations, it is impossible to exert the maximum tractive effort, which, in the case of the Pacific type of passenger locomotive amounts to but 32,000 lbs. at speeds higher than eight to ten miles an hour; the electric locomotive will develop its maximum tractive effort at a speed of 14 to 15 miles an hour. This tractive effort of 45,000 lbs. corresponds to an output of 1,750 horsepower. The electric locomotive, however, is more flexible and has a greater power than indicated by these figures. By means of the multiple unit control, which is a feature of these locomotives, two of these 90-ton units can be coupled together and operated by one engineer in the forward cab. All the motors are controlled simultaneously by one operating handle, and one engineer thus has under his control a maximum capacity of 3,500 h.p., or a maximum tractive effort of 90,000 lbs., developed from one 180-ton locomotive, which could move off

on a level track with a 6,000-ton load behind it or take a 1,000-ton load up a grade 80 ft. to the mile.

Electric Railway History.

From the report this week of the electrification committee of the New York Railroad Club the following brief history is summarized:

The first successful trolley installation was made in Richmond in 1888 by Mr. Sprague. For heavier traction, the third rail was first used in 1893 at the Chicago World's Fair, and in 1895 this was the distinctive feature of the equipment of the Metropolitan elevated in Chicago. The multiple unit system was first put in use in 1898 by the South Side Elevated of Chicago, and later by the elevated railways of New York City. The first important installation of heavy electric locomotives was by the Baltimore & Ohio in its Baltimore tunnel in 1895; smaller electric locomotives had been previously used for mining and industrial purposes. The Long Island Railroad's suburban zone third rail electric equipment was put in service in 1905. The West Jersey & Sea Shore, between Atlantic City and Philadelphia, was electrified in 1906, and in the same year the New York Central began operating electrically, both by locomotives and by the multiple unit system, a portion of its electric zone. In 1907 the Erie installed a multiple unit, high voltage, single-phase system on its Rochester division; also in 1907, the Spokane & Inland Empire Railroad was put in operation. This is the first railway built for heavy electric service, both freight and passenger, and the current is generated by water power. In 1908 the Grand Trunk Railway electrified the Sarnia tunnel. In 1909 the Cascade tunnel of the Great Northern was electrified. In this the three-phase system is used. The Pennsylvania expects to operate electrically its new terminal in New York City during the current year.

Railway Matters at Washington.

Washington, March 16, 1910.

The administration railway bill still finds rough sailing, and members of the house committee find new features that are objectionable every time the bill is taken up for discussion. One of the latest changes proposed is to give to the Interstate Commerce Commission the power to fix the price at which shares shall be exchanged when two roads are merged with one another, the idea being to compel the owners in such cases to reduce the amount of stock to the supposed actual value of the physical property. Another proposition would give the Interstate Commerce Commission power to regulate the price of all shares of stock sold by existing railways.

In the Senate Mr. Nelson proposes that traffic agreements between carriers (which are authorized by the pending bill) shall be filed with the Interstate Commerce Commission, and shall not take effect until 20 days after approval by the commission. Senator Nelson has also proposed further changes in section 12, which has already been discussed at great length in the committees in both houses, but without any definite conclusion.

The house committee has adopted an amendment to punish the shipper, as well as the railway, if he accepts payment of a damage bill which conceals a rebate, and another intended to provide further safeguards against the combination of railways and steamship properties.

Yesterday and to-day Senator Cummins, the chief critic of the administration bill in the Senate committee, has presented his objections at length on the floor of the Senate. He declares that the bill has not received really serious consideration in the committee, the majority accepting without question the draft prepared by the Attorney-General. While not imputing improper motives to the President or the Attorney-General, the senator deplored the practice of railway presidents going to the White House instead of to the committees in Congress. But the presidents had been there, and the bill bore no resemblance to that which was drafted last summer in New York by the special committee appointed by the President. Senator Cummins asserted that the proposed court of commerce would not be called upon to hear more than seven or eight cases a year, yet the court would cost \$100,000 yearly. The most seriously objectionable clause in the bill is that which transfers from the Interstate Commerce Commission to the Atto-

nor-General the duty of defending suits contesting orders of the commission. Senator Bailey joined in the criticism of this feature, declaring that with such a law the railways would be more interested in the selection of an attorney-general than of a president.

The house bill to amend the law concerning the reporting of railway accidents and to authorize the investigation of accidents, after slight changes, has been again reported to the Senate by the Senate committee.

Criticism of New York Public Service Commission.

(Representative of a "very large traction interest," quoted in the *Journal of Commerce*.)

"I do not believe a more honest set of men was ever brought together than the Public Service Board of the First district (New York City). They have kept out of all positions that would even bear the appearance of seeking personal advantages. But they are not big men. They are \$15,000-a-year men and should be \$25,000 or \$50,000-a-year men. When Chairman Willcox answers that if we cannot run our roads at a profit we should give up our franchises it is rather discouraging for investors."

"The traction system of New York needs many millions of dollars from investors. It will not be able to get these millions unless there is either a change in the personnel of the Public Service Commission or in the attitude of the present dominant members. The commission ever since its inception has lacked courage. It should have said to the railways: There are certain things that the traction future requires of you; you must buy new cars; you must rehabilitate your system; must put side doors in the subway cars and many other things; you must pay your men living wages and keep them contented and avoid strikes; we may want you to enter into joint routes; we know all this will cost money and we are prepared to stand back of you and aid you in getting from investors the money to secure a modern traction system. Of course, if the commissioners had taken such a stand the newspapers would probably have charged connivance with the railways; but they would have proved themselves big men. The people are not interested whether it costs 3.49 cents or 4.10 cents per passenger, but they are interested in securing proper scientific management of the roads."

"The Metropolitan is not earning 2½ per cent. on its real capital, the actual investment. The commission say that if the Metropolitan was not earning anything at all, it must go ahead, obey instructions and incur increased expenditures. The commission's demand for a joint rate at Fifty-ninth street meant that the company must conduct its business at a price that would not pay. Such orders drive capital away."

"The railways should be made to give the best service they can; they should not be permitted to make a large profit, or to pay dividends on watered stock. The commission, I think, should determine on what amount of stock the roads can earn fair returns on, but the roads should not be compelled to do impossibilities."

"Of course the Public Service Commission has had a tremendous job on its hands. Traction conditions that they have had to consider could not have been worse, and probably will never again be as bad; and they have been compelled to make decisions over night that parliamentary committees in England, for instance, would have spent years in investigating. * * * The commission claims credit for everything the roads voluntarily do. They learn of some improvement contemplated, for instance, and then send a letter demanding its immediate introduction. This is very small business."

American Railway Tool Foremen's Association.

This association has decided to hold its next meeting at Chicago July 12, 1910. O. T. Harroun, C. & A. Ry., Bloomington, Ill., is the secretary-treasurer.

American Society of Civil Engineers.

A meeting was held in New York City on March 16 at which a paper on "A Concrete Water Tower" was presented by A. Kempkey, and one on "Some Mooted Questions in Reinforced Concrete Design" by Edward Godfrey.

Canadian Society of Civil Engineers.

At the meeting on March 17 H. R. Lordly gave an illustrated address on "Subaqueous Concrete Work." W. H. Breithaupt read a paper on "Grade Separation."

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; May 10-13; Indianapolis.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.; June, 1910; Niagara Falls, Ont.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—C. M. Burt, Boston, Mass.; Havana, Cuba; March 28.

AMERICAN ASSOC. OF LOCAL FREIGHT AGENTS' ASS'NS.—G. W. Dennison, Penna. Co., Toledo, Ohio.

AMERICAN ASS'N OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew Bldg., Cincinnati, Ohio; March 18; Chicago.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th St., N. Y.; 2d Friday in month; New York; March 30-April 1; Charlotte, N. C.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York; May 18; New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—S. F. Patterson, B. & M., Concord, N. H.

AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASSOC.—E. H. Fritch, Monadnock Bldg., Chicago, March 14-17, 1910; Chicago.

AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis; second Tuesday, May; Memphis, Tenn.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Building, Chicago; June 20-22; Atlantic City.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.; July 12; Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. Edgar Marburg, Univ. of Pa., Philadelphia.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., N. Y.; 1st and 3d Wed., except July and August; New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., N. Y.; 2d Tues. in month; New York; May 31—June 3; Atlantic City.

AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 W. 39th St., New York.

ASSOCIATION OF AM. RY. ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; June 29, 1910; Colorado Springs.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A. T. & S. F. Topeka, Kan.; May 25-27; Chattanooga, Tenn.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wisconsin Central Ry., Chicago; May 16-20, 1910; Los Angeles.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Place, N. Y.

BUFFALO TRANSPORTATION CLUB.—J. N. Sells, Buffalo.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, Montreal, Que.; irregular, usually weekly; Montreal.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton Bldg., Pittsburgh.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R. R., Richmond, Va.; June 15, 1910; California.

INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., N. Y.; May 24-27; Niagara Falls, Ont.

INTERNATIONAL RAILWAY MASTER BLACKSMITHS' ASS'N.—A. L. Woodworth, Lima, Ohio; Aug. 16-18; Detroit, Mich.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago; May 23-26; Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.; May; Cincinnati.

IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August; Des Moines.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago; June 15-17; Atlantic City.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.

NORTH-WEST RAILWAY CLUB.—T. W. Flanagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, August; St. Paul and Minn.

NORTHERN RAILWAY CLUB.—Fourth Saturday in month; Duluth, Minn.

OMAHA RAILWAY CLUB.—A. H. Christiansen, Barker Blk.; 2d Wednesday in month.

RAILROAD CLUB OF KANSAS CITY.—Third Friday in month; Kansas City.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.; March 14; Chicago.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio; May 16-18; St. Louis.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASS'N.—H. M. Buck, Secy.-Treas., 30 Church street, New York.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Norquist, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. H. O'Donnell, Bogalusa, La.

SOUTHERN & SOUTHWESTERN R.R. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., Mar., July, Sept. and Nov.; Atlanta.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R. R., East Buffalo, N. Y.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg; 2d Monday, except June, July and August; Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago; 1st Wednesday, except July and August; Chicago.

Traffic News.

The Santa Fe lines on March 10 put into effect 3-cent passenger fares throughout Oklahoma.

Manufacturers and jobbers of Indianapolis, Ind., are forming a trade association with the purpose of establishing a bureau to deal with the railways.

The Toledo Chamber of Commerce is preparing a shippers' guide similar to that issued by the Chicago Board of Commerce. With this book the best route and the best time to any railway freight station in Ohio, Indiana or Michigan can be quickly found.

The New York Central & Hudson River has reduced to a uniform basis of two cents a mile all round-trip fares on the Hudson division. From Albany to New York and return the rate will be reduced from \$6 to \$5.75. Similar reductions are to be made on the line along the west side of the Hudson river.

The steamer Texan, of the American Hawaiian Steamship Company, arrived in New York last week with shipments of canned goods and other freight from San Francisco in 22 days. The route was by way of the Tehuantepec Railway, and the time was: San Francisco to Salina Cruz eight days, Salina Cruz to Puerto Mexico by railway (vessel to vessel) seven days, Puerto Mexico to New York seven days.

The Western Pacific has been opened for freight business for some weeks, but the reporters who try to find out how much freight is being moved have no success. They observe, however, that in January and February the gross revenues of the Denver & Rio Grande increased about 25 per cent. over the same period of 1909. It is conjectured that these large increases can have been possible only by reason of a large amount of traffic going over the Rio Grande for the Western Pacific.

Representatives of the commercial organizations of Omaha, Neb.; St. Joseph, Mo.; Sioux City, Iowa; South Omaha and St. Paul and Minneapolis conferred with executive officers of the western lines in Chicago on March 8 in regard to the advances which recently were made in rates on packing house products from these points to Chicago. They protested that the advances which had been made should not be kept in effect unless a proportionate advance is made from Kansas City.

The Pennsylvania Railroad Company is enlarging its work in the dissemination of farming literature, and has just sent out a series of pamphlets on orchard development, some 18,000 copies. The subjects are "Planting," "Cultivation," "Pruning" and "Spraying." The text matter was written specially for the Pennsylvania Railroad Company by Professor H. A. Surface, Economic Zoologist of the State of Pennsylvania. It was also approved by Hon. N. B. Critchfield, State Secretary of Agriculture.

The Oregon Railroad & Navigation Co. announces reductions, to go into effect March 20, averaging 14 per cent. on freight rates between Portland and points in Oregon east of The Dalles, in accordance with the order of the State Railroad Commission which was issued April 22, 1908. This order was contested in the courts, but has lately been sustained by the United States Circuit Court. Under the bond given by the railway company, shippers or consignees who have paid bills at the old rates during the past two years may now secure a rebate. It is not unlikely, however, that the road may carry the case to the Supreme Court.

David O. Ives, president of the Boston Merchants' Association Board of Transportation and formerly an officer of the Wabash Railroad; William C. Maxwell, general traffic manager of the Wabash, and S. C. Freisner, foreign freight agent of the same road, were arraigned in the United States Circuit Court at New York March 14 and pleaded not guilty to indictments found against them in September last for violations of the Interstate Commerce law. They were held in \$5,000 bail each for trial. William F. Schmidt, western representative of the Missouri Pacific, and Robert Burnap, formerly general traffic agent of the Central Vermont, were unable to appear. The district attorney did not ask for their arrest, as he had been informed that they would appear as soon as they were able to get to the city. It was announced that the

Government was still continuing the investigation of the agreements between the railway lines and the transatlantic steamship company, which led to these indictments. The indictments charge the giving and receiving of rebates.

The St. Louis lines are still considering the advisability of establishing a joint down town ticket office. A committee, composed of John M. Beall, B. H. Payne and W. S. St. George, general passenger agents, respectively, of the Mobile & Ohio, the Missouri Pacific-Iron Mountain system and the Missouri, Kansas & Texas, reported that the plan was favorable as a measure of economy and that a large and commodious corner location could be secured at a rental of one-fourth of what is paid for the various present offices of the roads interested. The committee will make further inquiries and report at a later meeting on desirable locations for down town union offices at a rental not to exceed \$30,000 a year.

Reporting Unclaimed or Refused Freight.

There has been a great deal of discussion for some time between shippers and railway traffic men of the matter of the railways sending reports to consignors of unclaimed or refused freight. The National Industrial Traffic League has been trying to get the railways to adopt some consistent method of reporting, but the roads have been loath to do so because they have feared that they might thereby increase their liability for loss and damage. At present they are ordinarily not liable for failing to make such reports, but if they should put a provision in their tariffs that they would do so they would at once become liable for any failure to carry out the tariff provision.

The Virginia Claim Conference at a meeting in Washington, D. C., on January 28, adopted a method of reporting unclaimed

or refused freight which the shippers believe solves the problem in a way that will be satisfactory to both interests. The carrier under this plan does not print in its tariffs a provision that reports will be made and does not even agree to make them. It does, however, adopt a form of which the following is the substance:

The shipment is refused, unclaimed and if you have legal interest in same you are respectfully requested to furnish disposal orders at once through THE AGENT OF THE CARRIER ISSUING THE BILL OF LADING or arrange with consignee to remove shipment at once to prevent further accumulation of storage charges. We are authorized by law to sell the shipment for freight and storage charges if same is not removed within the statutory period. This notice is voluntary, is issued as information to consignor, and no liability shall attach to carriers for failure of the notice to perform its mission, or for failure to issue similar notices on other shipments.

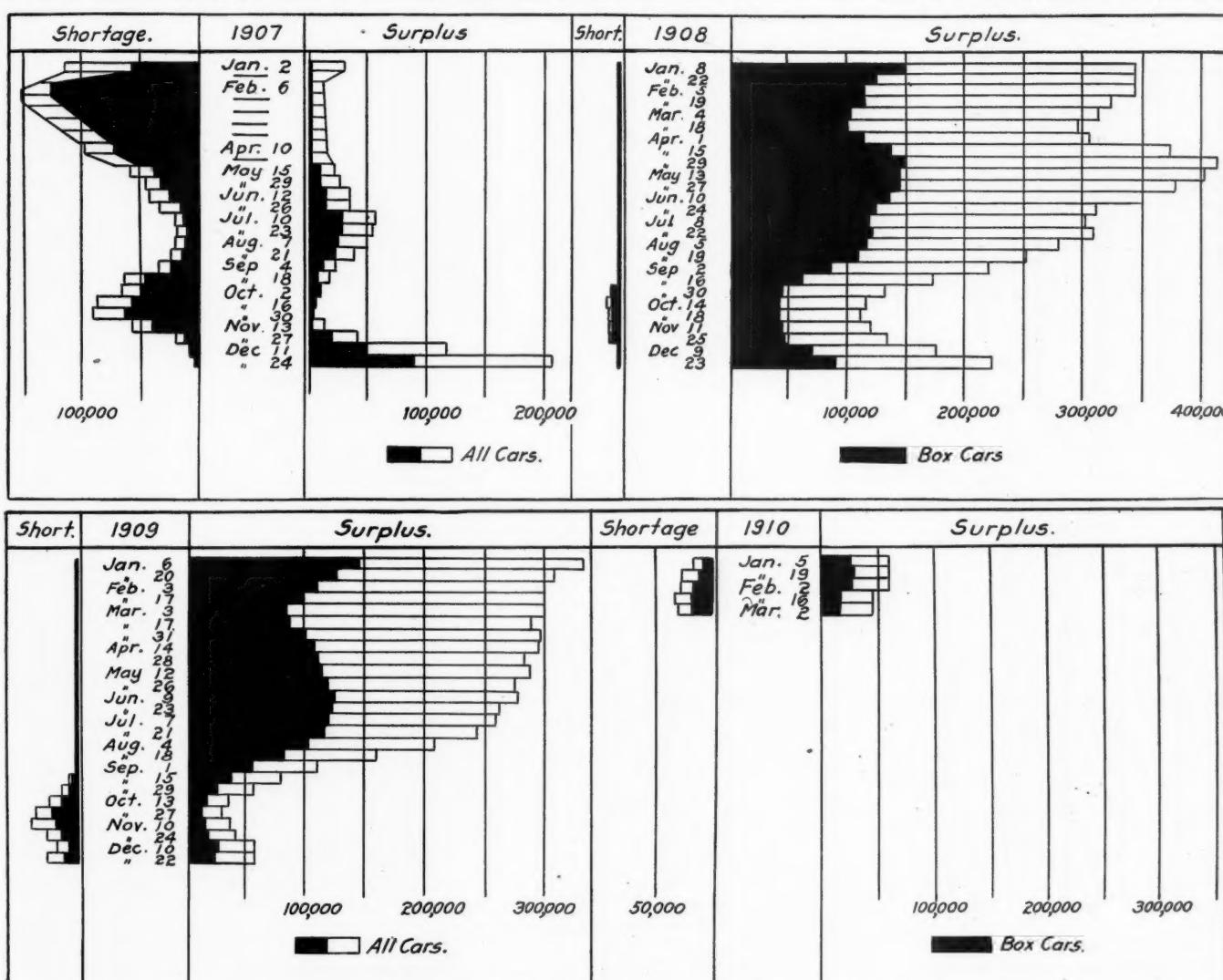
INSTRUCTIONS TO AGENTS.—Reconsignment orders from shipper must be accepted only when received from the initial carrier, or through the Freight Claim Agent.

Order-Notify shipments must not be reconsigned without surrender of Original B/L, unless authorized by Freight Claim Agent.

Under this plan report is made to the consignor, to the agent at the forwarding station and to the claim agent. The National Industrial Traffic League will try to have the northern and western lines adopt a similar plan. With this object a conference will be sought between the freight claims committee of the league and a similar committee of the Freight Claim Agents' Association.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in pre-



Car Surpluses and Shortages in 1907, 1908, 1909 and 1910.

senting statistical bulletin No. 67 giving a summary of car shortages and surpluses by groups from October 28, 1908, to March 2, 1910, says:

"There is practically no change in the situation since the date of our last bulletin, the surplus having decreased only 198 cars and the shortage 1,297 cars. While the shortage is still chiefly in coal cars in groups 2 (Eastern), 3 (Middle)

STATE COMMISSIONS.

The Indiana Commission is preparing to prosecute the Southern Railway for violation of the safety appliance law, and the Pennsylvania for violation of the hours of service law.

The United States circuit court has again decided against the railway in a suit, pending since May 11, 1908, attacking

CAR SURPLUSES AND SHORTAGES.

Date.	Number of roads.	Surpluses.					Shortages.				
		Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1—March 2, 1910....	8	6	1,011	341	55	1,413	258	15	2,717	13	513
" 2 " " 2, 1910.....	21	208	227	1,352	550	2,337	445	20	2,771	1,652	3,190
" 3 " " 2, 1910.....	23	300	284	768	1,711	3,063	3,586	38	3,491	700	8,029
" 4 " " 2, 1910.....	10	1,438	93	452	801	2,784	2,301	578	845	152	6,530
" 5 " " 2, 1910.....	20	1,307	459	359	684	2,809	2,321	578	845	152	3,896
" 6 " " 2, 1910.....	18	3,232	639	2,172	2,737	8,780	5,081	22	57	758	5,918
" 7 " " 2, 1910.....	4	136	116	483	643	1,378	.....	.....	.....	.....	.....
" 8 " " 2, 1910.....	14	813	347	929	1,460	3,549	143	.....	21	83	247
" 9 " " 2, 1910.....	9	1,210	388	164	698	2,460	.....	40	22	62	.....
" 10 " " 2, 1910.....	19	3,101	1,270	2,235	4,733	11,339	47	26	.....	13	86
" 11 " " 2, 1910.....	6	2,718	1,779	32	874	5,403	1,167	.....	.....	269	1,436
Grand total	152	14,469	6,613	9,287	14,946	45,315	15,349	699	9,942	3,917	29,907

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and North and South Dakota lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; and Group 11—Canadian lines.

and 4 (South Atlantic), there is a slight increase in the surplus and an unimportant decrease in the shortage of this class. There is little change in the box car situation, either by groups or in the grand total."

INTERSTATE COMMERCE COMMISSION.

Reasonable Joint Rate in Existence.

Sunnyside Coal Mining Co. v. Denver & Rio Grande et al. Opinion by Commissioner Prouty.

Complainant shipped two carloads of coal from Strong, Colo., to Quinn and Cottonwood, S. Dak., over a route taking combination rates. There were open to the complainant joint through rates over another route under which this coal might have moved which compare favorably with other rates in that section and which are reasonable. Instead of availing itself of those rates the complainant saw fit to ship this coal to Rapid City and thence to destination. The fact that it might have availed itself of a reasonable joint rate is no reason why it might not adopt the route selected; nor why it should not be accorded from Rapid City to destination a reasonable local rate; but the commission is not satisfied on this record that the rates charged were in this case unreasonable, although they are abnormally high and would be excessive under ordinary conditions. Complaint dismissed. (17 I. C. C., 540.)

Two Single-Deck Cars Equal One Double-Deck Car.

Corn Belt Meat Producers' Association v. Chicago, Burlington & Quincy et al. Opinion by Commissioner Prouty.

Certain tariffs of defendants in other states provide that when double-deck cars cannot be furnished and single-deck cars are used instead for the convenience of the carrier, two single-deck cars shall be treated in computing the rates and the minimum as one double-deck car; held, that the tariffs of defendants establishing these rates from Iowa points ought to contain the same provision, with the limitation that it shall apply only when seasonable notice has been given by the shipper of his desire to use the double-deck car.

Certain territorial regroupings and reductions in cattle rates are prescribed. The advances in hog rates made by the defendants since the publication of the original opinion are condemned and the rates then in effect are restored.

No order will be made in this case for 60 days. Unless defendants within that time have filed schedules putting into effect the rates suggested in this opinion, the commission shall take up the case again and proceed to the making of a definite order. (17 I. C. C., 533.)

the constitutionality of the law establishing the State Railroad Commission of Oregon.

The Michigan State Railway Commission has issued a general order requiring all railways to have their cabooses equipped with end platforms and platform steps. Many are now using side stirrup steps.

The Railroad Commission of Louisiana has ordered that there shall be no change in the rates authorized or established for seats or berths in sleeping cars, chair cars or parlor cars between points in the state without the consent of the commission.

The Indiana Commission has brought suit in court against the Cincinnati, Indianapolis & Louisville to enforce an order issued last August regulating freight rates on coal, sand and gravel. The railway company some time ago brought suit in the federal court against the commission, but in that court the commission's demurrer was sustained.

COURT NEWS.

The supreme court of the United States, by a divided bench of four to four, has affirmed the decision of the lower federal court holding that the proper unit for assessing penalties under the 28-hour law, forbidding the keeping of animals in cars longer than that time, is the shipment and not the train. That is to say, a train of 30 cars consigned to or by 30 different parties would, if illegally delayed, incur a penalty of 30 times as great as a train of the same size all sent by one shipper to one consignee.

Judge Hazel in the United States circuit court at Buffalo, March 12, continued the injunction, referred to in our last issue, page 538, forbidding an advance in rates on coal and coke from the Connellsburg (Pa.) region to Buffalo, which had been announced by the principal roads. The complainants, the Lackawanna Steel Co. and other Buffalo concerns, were required to give an indemnity bond, to save the roads harmless until the Interstate Commerce Commission can pass on the reasonableness of the proposed advance.

The supreme court of the United States has sustained the state of North Dakota in the coal rate suit. The law of 1907 is held to be constitutional despite the claim of the railway that it requires the transportation of coal below the cost of service. The decision of the supreme court of North Dakota is affirmed. Justice Holmes said that there were so many uncertainties about the rate being confiscatory that the supreme court felt it was not justified in overruling the state court, which held the law would not prove confiscatory if put into effect. The affirmance was made, however, with the statement that it should not prejudice the case of the railways if after the law went into effect it should prove confiscatory.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JANUARY, 1910.

See also issue of March 11.

Railway Officers,

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. S. Kies, general attorney of the Chicago & North Western at Chicago, has been appointed general solicitor of the Chicago & Western Indiana and the Belt Railway of Chicago, with office at Chicago.

Frederick H. Meeder has been appointed assistant to Vice-President John Carstensen, of the New York Central Lines, with office at New York City. Mr. Meeder was born on January 7, 1869, at Brooklyn, N. Y., and was educated in the public schools at South Orange and East Orange, N. J. He began railway work on May 12, 1886, in the treasurer's office of the Michigan Central at New York. He went to the New York Central & Hudson River as clerk in the comptroller's office in June, 1890, and about a year later was appointed general bookkeeper, remaining in that position until February 1, 1903, when he was made chief clerk to the auditor. On October 1, 1905, he was appointed chief clerk to Vice-President Carstensen, which position he held at the time of his recent appointment.

E. O. McCormick, assistant traffic director of the Southern Pacific, the Union Pacific, the Oregon Railroad & Navigation Company, the Oregon Short Line and the Oregon & Washington at Chicago, has been elected a vice-president of the Southern Pacific, with office at San Francisco, Cal.; he will be in charge of traffic on the Pacific system. William F. Herrin, chief counsel of the Southern Pacific and vice-president of the California Northeastern and the Pacific Electric Railway at San Francisco, has been elected vice-president of the Southern Pacific, with office at San Francisco; he will be in charge of the legal and land departments. E. E. Calvin, vice-president and general manager at San Francisco, has been elected vice-president in charge of transportation, construction, purchasing and hospital departments, with office at San Francisco.

Operating Officers.

J. R. McKee has been appointed a trainmaster of the Missouri, Kansas & Texas, with office at Parsons, Kan.

L. M. Mills has been appointed superintendent of dining cars on the Missouri Pacific-Iron Mountain system, with office at St. Louis, Mo., succeeding G. L. Bonney, resigned.

G. H. Emerson, superintendent of motive power of the Great Northern, at St. Paul, Minn., has been appointed assistant general manager, with office at St. Paul, succeeding H. A. Kennedy, resigned.

G. W. Melbourne has been appointed assistant trainmaster of the Elgin, Joliet & Eastern, with office at Joliet, Ill. He will have jurisdiction over the Joliet division except Joliet terminals and the Rossville district.

W. C. Morse, superintendent of the Missouri Pacific-Iron Mountain system at Ferriday, La., has been transferred to Wynne, Ark., succeeding H. J. Scheuing. C. M. Andrews, trainmaster at Little Rock, Ark., succeeds Mr. Morse, and W. S. Coffin succeeds Mr. Andrews.

J. H. Stanfiel, superintendent of the Mobile division of the Southern, with office at Selma, Ala., has been appointed superintendent of the Birmingham division, with office at Birmingham, succeeding W. R. Hudson, promoted. J. Lasseter, trainmaster at Wilton, succeeds Mr. Stanfiel, with office at Selma.

The Electric division of the New York Central & Hudson River has been extended northward from Block station 7 to Croton, N. Y., inclusive, and Croton is now the southern terminus of the Hudson division. A. R. Whaley is the general superintendent of the Electric division, with office at New York.

Charles Ware, superintendent of the Nebraska division of the Union Pacific at Omaha, Neb., has been appointed general superintendent, with office at Omaha, succeeding W. L. Park, resigned to become vice-president of the Illinois Cen-

tral. W. R. Cahill, assistant superintendent at Omaha, succeeds Mr. Ware. W. D. Lincoln, car service agent at Omaha, has been appointed superintendent of transportation, with office at Omaha, and the title of car service agent has been abolished. Mr. Lincoln will continue to perform the duties of that office.

John W. Eber, who has been appointed superintendent of the Adirondack division of the New York Central & Hudson River, with office at Utica, N. Y., was born July 14, 1871, at Jersey Shore, Pa. He

began railway work on February 27, 1890, as a rodman on the West Shore, now a part of the New York Central, and for the six years following was in the engineering department of that road. On November 27, 1896, he was appointed assistant roadmaster at Canajoharie, N. Y., and in May, 1899, became supervisor of track on the West Shore division. Three years later he was made supervisor of track on the New York Central at West Albany, where he remained for two years, and was then appointed division engineer at

Watertown. On March 6, 1905, he was made engineer of track, with office at New York City. In April, 1909, he was appointed assistant superintendent of the New York Central stock yards at Buffalo, remaining in that position until his recent appointment as superintendent of the Adirondack division. The Mohawk & Malone and the St. Lawrence & Adirondack railways, heretofore included in the Mohawk division of the New York Central & Hudson River, will in future be operated as the Adirondack division.

Traffic Officers.

J. B. Modisette, whose appointment as general passenger agent of the Vandalia Railroad, with office at St. Louis, Mo., was announced in the *Railway Age Gazette* in its issue of February 25, page 433, was born April 19, 1859, at Uniontown, Pa.

He attended Cheytenham academy, Philadelphia, and studied also at Pottstown, Pa.; and he began railway work about 20 years ago with the Pennsylvania system. He was first assistant ticket agent at Cincinnati, and was then consecutively chief clerk in the office of the assistant general passenger agent at Chicago; chief clerk in the passenger department of the Vandalia at St. Louis; city passenger agent at Chicago; district passenger agent and later assistant general passenger agent at Cleveland. About three years ago he was appointed first assistant general passenger agent at Pitts-

J. R. Clack has been appointed a commercial agent of the Southern, with office at Sumter, S. C.



John W. Eber.



J. B. Modisette.

Leroy Blue has been appointed a traveling freight agent of the New York Central Lines, with office at Spokane, Wash.

H. G. Benedict has been appointed commercial agent of the Atlanta, Birmingham & Atlantic, in charge of the new agency at Kansas City, Mo.

C. C. Landers, division freight and passenger agent of the Wabash at Danville, Ill., has had his jurisdiction extended to include stations on the Altamont branch, not including Bement, Ill.

R. G. Parks has been appointed traveling freight and passenger agent of the Georgia & Florida, with office at Augusta, Ga. B. F. Holzendorff, traveling freight and passenger agent, with office at Douglas, Ga., having resigned, that office is abolished.

Ralph T. Bretz has been appointed assistant general western freight agent of the Northern Pacific, with office at Tacoma, Wash. O. R. Lonergan has been appointed general agent in the freight department, with office at Tacoma, Pa., from which position he has recently been promoted.

Engineering and Rolling Stock Officers.

A. B. Pollock, assistant supervisor of signals of the Pennsylvania Railroad at West Philadelphia, Pa., has been appointed a supervisor of signals.

S. J. Hungerford, shop superintendent of the Canadian Pacific at Winnipeg, Man., has been appointed superintendent of rolling stock of the Canadian Northern, with office at Winnipeg.

W. E. Woodhouse, master mechanic of the Canadian Pacific at Calgary, Alb., has been appointed shop superintendent at Winnipeg, Man., succeeding S. J. Hungerford, resigned to go to another company.

J. H. Farmer, master mechanic on the Fourth division of the Denver & Rio Grande at Alamosa, Colo., has been appointed master mechanic of the Rio Grande Southern, with office at Ridgway, Colo.

W. S. Johns, Jr., has been appointed a supervisor on the Allegheny division of the Pennsylvania Railroad, with office at East Brady, Pa., pending the return to duty of H. R. Catlin, who has been granted leave of absence.

The Choctaw district of the Rock Island Lines having been abolished, the jurisdiction of A. B. Warner, district engineer of the Southern district, at Fort Worth, Tex., has been extended over the Arkansas, the Louisiana and the Indian Territory divisions.

Special Officers.

W. L. Glessner has been appointed land and industrial agent of the Georgia & Florida, with office at Augusta, Ga.

Controversy Over Station at Geneva.

A French company, the Paris, Lyons & Mediterranean, owns its station in Geneva, with the very short section of line which is on Swiss territory. For a long time, and especially since the state system has been established, the Swiss have desired to acquire this station, and in the course of the negotiations last year for better connection with the Simplon Tunnel route, it was agreed that either the confederacy or the canton of Geneva (which is little more than the city) might do so on certain terms. The question of purchasing it is now up in Geneva, and, strange to say, it is made largely a religious one. Those who think of Calvin and Geneva as almost synonymous terms, may be surprised to learn that the population is almost equally divided between Catholics and Protestants. Now it seems that the whole force of station employees of the French Company is Catholic, and the purchase by the canton is denounced as a measure for "protestantising" the railway station, it being certain that if in government hands no discrimination would be made on account of religion.

Railway Construction.

New Incorporations, Surveys, Etc.

ABILENE CENTRAL.—J. M. Wagstaff, chairman, Abilene, Tex., is said to be asking for bids up to noon March 21 for building 56 miles of main line and six miles of sidings and switches between Abilene and Rising Star. The work will include clearing and grubbing 500 acres; earth excavation and embankment work, 972,000 cu. yds.; loose rock excavation, 24,000 cu. yds.; solid rock excavation, 36,000 cu. yds. H. J. Bradshaw, engineer, Abilene. (March 4, p. 460.)

ALEXANDRIA & WESTERN.—An officer is quoted as saying that work will be started at once on this line. The projected route is from Alexandria, La., west via Leesville to the Sabine river at the Texas border. It is the intention of the company to eventually extend the line to a point in Texas. G. F. Cotter, president; I. W. Sylvester, chief engineer, Fort Worth. (Oct. 22, p. 776.)

ALTUS, WICHITA FALLS & HOLLIS.—See Wichita Falls & Northwestern.

ARIZONA & COLORADO.—See Southern Pacific.

ARIZONA EASTERN.—See Southern Pacific.

ARKANSAS VALLEY INTERURBAN.—According to press reports from Wichita, Kan., work will be started at once by the Jennings Construction Co., on this line, from Wichita, north to Valley Center, 10 miles. The line is ultimately to be extended northwest to Hutchison, 40 miles additional. The company has also secured a right-of-way for a line down the west side of the Arkansas valley south via Oxford to Arkansas City, but work on this end will not be started until the northern end of the line is completed. It is expected to have the first section of 10 miles open for traffic by July. The construction company has established a camp midway between Wichita and Valley Center, and work will be pushed both north and south from that place.

CHERRYVALE, OKLAHOMA & TEXAS.—An officer writes that work was started March 10 locating this line from Caney, Kan., southeast via Wann, Okla., to Nowata, thence east to Vinita, 62 miles, and contracts will be let as soon as possible. Maximum grades will be 1 per cent. and maximum curvature 6 degs. The work includes one steel bridge. S. M. Porter, Caney, president; B. J. Dalton, chief engineer, Lawrence. (March 11, p. 546.)

CHICAGO, AURORA & DE KALB (ELECTRIC).—An officer writes that this company is now at work with its own men electrifying the line from Aurora, Ill., west to De Kalb, 30 miles. The equipment for special stations, rolling stock, transmission and distributing line has been bought.

CHICAGO GREAT WESTERN.—This company is establishing construction camps near Oelwein, Iowa, it is said, and will continue the work of double-tracking the line to Chicago. The present double-track from Dubuque, Iowa, east to Stockton, Ill., is to be extended further east to Pearl City, also from Stanley east to Aurora.

See Great Northern.

CHICAGO, MILWAUKEE & ST. PAUL.—See Great Northern.

CHICAGO, ROCK ISLAND & PACIFIC.—See Great Northern.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—See report of this company elsewhere in this issue.

DENVER & GULF.—An officer writes that at the present time no definite information concerning the plans of this company can be given out, as a number of changes are to be made in the proposed plans. The promoters expect to build a new line, to be about 125 miles shorter than any existing line from Denver, Colo., southeast to Dallas, Tex., the work to be carried out within two years. Contracts are said to have been entered into with residents of Lamar, Colo., whereby the railway company agrees to construct and put in operation 150 miles between Lamar and Texhoma, Okla., before July 1, 1911, and this work in addition to contracts already made in Texas will insure the completion of 350 miles by that date. The line is eventually to be extended south to the Gulf of Mexico. A 24-mile branch from the main line north of Tex-

homa is to be built west into undeveloped coal fields, and another branch is now under construction from Texhoma south to Amarillo, Texas, 90 miles. Franklin A. Umsted, president, Texhoma; W. R. Evans, vice-president, Lamar, Colo. (Feb. 11, p. 328.)

DETROIT RIVER TUNNEL.—See Michigan Central.

EASTERN ILLINOIS.—Incorporated in Illinois, with \$1,000,000 capital and office at Chicago. The plans call for a line from a point in Cook county, near West Hammond, via Harvey to a point near Riverdale, about 16 miles. W. E. Snyder, 2808 West Warren avenue, Chicago; W. H. Robinson, E. H. Pank and S. Blumenthal, all of Chicago, are directors.

FAIRMONT & PITTSBURGH.—Organized in West Virginia, with \$1,000,000 capital and office at Fairmont, W. Va. The plans call for a line from Fairmont north via Blacksville and Waynesburg, Pa., to Pittsburgh, about 75 miles. The company is also authorized to build a loop line from Fairmont northwest to Mannington, Blacksville and Morgantown, thence along the Monongahela river, returning to Fairmont. W. M. Laws, Jersey City, N. J.; J. F. Beatty, Mannington, W. Va., and S. E. Miller, Fairmont, are said to be interested.

GALLATIN VALLEY.—An officer writes that this company is now operating 20 miles of railway in Montana, and will let contracts at once for building 27½ miles between Bozeman, Mont., and Three Forks. The work will include several large trestles and at least one 200-ft. steel span. N. C. Van Natta, chief engineer, Bozeman. (Nov. 19, p. 990.)

GALVESTON-HOUSTON (ELECTRIC).—According to press reports a contract has been given to the North American Dredging Co. to build 2.6 miles of roadbed on Galveston island from the causeway to the city limits of Galveston. It is expected that additional contracts will be let at once for building 16 miles on the main land from near Texas City junction to Clear Creek, and about April 1 for 19 miles between Clear Creek and Brays bayou. These two short sections will be built during the coming summer, and the entire line from Houston southeast to Galveston, 50 miles, is expected to be finished about January, 1911. The estimated cost of the line is \$2,000,000, including equipment. The Stone & Webster Engineering Corporation, Boston, Mass., are building the line. There will be 30 small bridges. The company will have temporary headquarters in Galveston. J. B. Townsend is chief engineer and general superintendent of construction. Mark Lowd is Southwest manager for the Stone & Webster Engineering Corporation. (Jan. 28, p. 209.)

GEORGIA & FLORIDA.—Track-laying has been started recently on the connecting link from Normantown, Ga., north to Swainsboro, 20 miles. From that place the line is completed north to St. Clair, and it is expected that by the middle of June the extension from St. Clair north to Augusta, 28 miles, will be finished and the company will be operating trains over its own tracks to Augusta. This new line will be shorter than the present route via Millen, from which place the tracks of the Central of Georgia are now used to Augusta. (Dec. 10, p. 1167.)

GRAND TRUNK PACIFIC.—A statement has been issued by this company, which shows that of the 7,900 miles already authorized, 4,800 miles have been completed or are under contract. On the main line of 3,500 miles a total of 3,000 miles is under construction, of which 1,795 miles has track laid. From Winnipeg track is laid west to Wolf Creek, 915 miles, and east to Fort William, Ont., 445 miles, making a continuous stretch of 1,360 miles. The Winnipeg-Fort William section will not be ready for trains for some months. Contracts have been let for the section from Wolf Creek west to Tete Jaune Cache, in the Rocky mountains, where a large force of men and 1,000 teams are now at work. On a section of 240 miles east from Prince Rupert, B. C., work is also under way, and construction is being carried out on over 686 miles of branch lines in Saskatchewan and Alberta. (Feb. 11, p. 333.)

GREAT NORTHERN.—Work is to be started this year by the railways in Minneapolis, Minn., it is said, that will cost more than \$10,000,000, enlarging the Minneapolis terminals and increasing the freight handling capacity. The most important work will be the Northtown cut-off by which the Great North-

ern will shorten the distance from its northern entrance to the union station from five to three miles, and the Northern Pacific will also avoid entering through the congested Omaha and Soo line yards. The cut-off will be an elevated line and cost about \$2,000,000. The Rock Island has bought 200 ft. frontage on Fifth street adjoining its present terminals for eventual enlargement. Improvements are also to be made by the Great Northern in the Bryn Mawr district, as well as by the Minneapolis & St. Louis in the same section. It is probable that the Chicago, Milwaukee & St. Paul will build shops near Hopkins. A proposition is now under consideration for the elimination of grade crossings along the Hastings & Dakota division of this road, which crosses south Minneapolis. The Minneapolis, St. Paul & Sault Ste. Marie will put up an office building, also a roundhouse at the Shoreham shops. The Chicago Great Western will make some improvements to its terminals, as well as the Minneapolis & Western, which is a switching road. The Minnesota Railway Transfer, operating a large yard, has bought 250 acres of land near New Brighton and is making plans for track-laying and improvement work that will greatly increase its facilities.

ILLINOIS OIL & COAL BELT.—An officer writes that this company will begin work this year on a line from Terre Haute, Ind., southwest to Cairo, Ill., about 200 miles. Contract let to the Western Indiana Construction Co., 6 Sherman street, Chicago. Maximum grade will be 1 per cent., and maximum curvature 4 degs. There will be two steel bridges. James R. Campbell, president; Allan G. Russell, chief engineer, McLeansboro, Ill. (March 11, p. 547.)

LAKE SHORE & MICHIGAN SOUTHERN.—See report of this company elsewhere in this issue.

LANSING & NORTHEASTERN (ELECTRIC).—Plans for the construction of this road have been finished and it is expected to have the line in operation by October of this year. The first section to be built will be from Lansing, Mich., northeast to Owosso, 30 miles. An extension is projected from Morrice east through Duran, thence northeast to Flint, also an extension from Owosso northeast to Saginaw. The Michigan Railway Commission has recently authorized the company to issue \$800,000 in bonds to provide funds for building the line. G. G. Moore, Detroit, and T. W. Atwood, Caro, are interested. (Feb. 18, p. 379.)

LYNCHBURG, AMHERST & NORTHERN.—Surveys are to be started at once, it is said, from a point near Lynchburg, Va., north via Amherst to Sandiges and Lowesville, about 30 miles. There will be three steel bridges, each about 100 ft. long. H. L. Page, president; J. Campbell, Amherst; W. A. Taylor, Lynchburg, and W. E. Walker, Sweetbrier, Va., are said to be interested.

MEXICAN SOUTHERN.—See National Railways of Mexico.

MICHIGAN CENTRAL.—The report of this company for the year ended December 31, 1909, shows that the construction of the double-tube tunnel under the Detroit river by the Detroit River Tunnel Co. is nearing completion. The open cuts and approaches on both sides of the river are finished and the tunnel under the river is finished so far as to be open for use for the purposes of construction. There remains only a portion of the interior lining of the sub-aqueous tunnel and the tracks and electrification work yet to be added. It is expected to have the tunnel in operation early in 1910. An arrangement has been made by which the company can secure property in the city of Detroit for a new passenger station, and can also close a number of streets and construct subways. See report elsewhere in this issue. (Sept. 24, p. 563.)

MINNEAPOLIS & ST. LOUIS.—See Great Northern.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—Foley, Welch & Stewart, St. Paul, Minn., are said to have contracts for building the cut-off from New Richmond, Wis., west to Withdraw, Minn., 17 miles, also for the cut-off from Spencer, Wis., west to Owen, 19 miles. The work includes putting up a steel bridge over the St. Croix river. (Feb. 11, p. 329.)

MISSOURI, KANSAS & TEXAS.—An officer writes that Patton & Gibson, contractors, have finished the work between Atoka, Okla., and Red river, on a section of 46 miles, reducing the existing grade and providing roadbed for double-track. The

same contractors are reducing the grade to 0.40 per cent. and grading for double-track from Atoka north to Stringtown, eight miles; and also have a contract for reducing the grade and the curvature at Limestone Gap on a section of two miles, at a point 11 miles north of Stringtown. It is expected to have all this work finished this fall. (March 4, p. 461.)

MONTANA RAPID TRANSIT.—An officer writes that only preliminary work is now under way on this line. According to press reports right-of-way has been secured and some grading finished between Helena, Mont., and Butte, about 55 miles. J. K. Toole, president; A. W. Verharen, chief engineer, Helena.

NATIONAL RAILWAYS OF MEXICO.—According to press reports the Mexican Southern is to be extended east via Magdalene, Oax., to Tlacolula, and will probably eventually be extended east to a connection with the National Tehuantepec. Surveys for the proposed extension are now being made and contracts will be let soon for the section as far as San Dionisio, about 20 miles southeast of Tlacolula.

NEVADA-CALIFORNIA-OREGON.—Bids are to be asked for about April 1 to build an extension from Alturas, Cal., north to Lake View, Ore.

NEW YORK CENTRAL & HUDSON RIVER.—See report of this company elsewhere in this issue.

NORTH COAST.—According to press reports this company has amended its charter and announced that it will build lines as follows: Seattle, Wash., east to Spokane, 350 miles, through the counties of King, Pierce, Lewis, Yakima, Benton, Franklin, Adams, Whitman and Spokane, with a branch from the main line in either Benton or Franklin county to Walla Walla; also branches from the main line in Adams county to Eureka junction; another to Davenport, and a third to Wilson creek. The plans include a line from Spokane southeasterly via Tekoa to Lewiston, Idaho. Press reports say that work is being rushed from both ends of the section on the main line between Spokane and Benton county. (Nov. 12, p. 943.)

NORTHERN PACIFIC.—See Great Northern.

OMAHA, WESTERN & LINCOLN (ELECTRIC).—Surveys are said to be finished and contracts let to the Osceola Construction Co., Lincoln, Neb., to build this line. The plans call for a line from Omaha southwest to Hastings, about 200 miles, with a branch south to Lincoln. F. E. Schaff, president, Lincoln; W. H. Fuller, chief engineer, Hastings. (Jan. 14, p. 114.)

PENNSYLVANIA MIDLAND.—See Pennsylvania Railroad.

PENNSYLVANIA RAILROAD.—Grading work and laying rails on the Pennsylvania Midland between Bedford, Pa., and Altoona has been finished and only some bridge work remains to be done. The construction work from Bedford to Cumberland, Md., is now under way. Trains will be put in operation from Altoona to Bedford in June and to Cumberland this coming fall.

PENNSYLVANIA ROADS.—A company has been incorporated in Pennsylvania to build from New Park, Pa., east to a connection with the Maryland & Pennsylvania, at Delta, about 10 miles. As part of the line will pass through Maryland the company will ask for a new charter. Residents of New Park are interested in the project. J. H. Anderson, president; J. H. Gehey, secretary; A. H. Strawbridge, treasurer, and J. C. Wiley, general manager.

PITTSBURGH & SUSQUEHANNA.—Incorporated in Pennsylvania, with \$100,000 capital, to build from Utahville, Clearfield county, Pa., south to Dean, Cambria county, 10 miles. The incorporators include: T. F. Barrett, president; R. K. Klack, J. H. Smeltzer, C. D. Bruce and H. G. Vancouver, all of Philadelphia.

RED RIVER VALLEY & TEXAS.—Organized to build from a point near Chillicothe, Tex., through undeveloped territory probably to a point near Ardmore, Okla. Grading work has been started. There will be 10 steel bridges. F. L. Mercer, president and general manager; G. Kenfaver, chief engineer, Davidson, Okla.

SIOUX FALLS & WESTERN.—Incorporated in South Dakota, with \$1,000,000 capital and office at Sioux Falls, S. Dak. The plans call for a line from Sioux Falls west to Wheeler, about 125 miles. The incorporators include: R. F. Brown, S. Fantle, G. B. Tuthill, F. H. Hollister and G. T. Blackman, all of Sioux Falls.

SOUTHERN PACIFIC.—An officer writes that no construction is contemplated as a consequence of the consolidation of the several short lines in Arizona recently under the name of the Arizona Eastern. Prior to this consolidation, the Gila Valley, Globe & Northern was building two short extensions from Globe, Ariz.; one, northeasterly 10 miles to recently developed copper property, and the other southeasterly about five miles to other copper developments. The Arizona Eastern at the same time was building 29 miles through the Gila canyon from the terminus of the Phoenix & Eastern at Winkelman northeast to San Carlos, on the Gila Valley, Globe & Northern. All of the smaller companies were making surveys, but nothing has been decided upon definitely as to when these lines will be constructed. (March 4, p. 460.)

An officer writes that the Arizona & Colorado has located a line from Gallup, N. Mex., north via Farmington to Durango, Colo., and contributions to be used for buying the right-of-way are being subscribed by residents of various places along the route. The company has not yet definitely determined when actual construction work will be started. (March 4, p. 460.)

TEMPLE-NORTHWESTERN.—An officer writes that contracts have been let to D. J. Grigsby, Temple, Tex., and work was started March 17 on the first section of 60 miles. The plans call for a line from Temple, Tex., northwest via Gatesville, Hamilton, Comanche, Gorman, Eastland, Breckenridge, Crystal Falls, Throckmorton and Munday to Benjamin, in Knox county, about 210 miles, air line. There will be five steel bridges. (See Temple & Northwestern, March 4, p. 461.)

TRINITY VALLEY & NORTHERN.—A contract is said to be let for building the extension of this road from Fouts, Tex., north to a connection with the Gulf, Colorado & Santa Fe. It is expected to have the work finished in two years. (Feb. 4, p. 281.)

WHITEFISH & POLSON.—An officer writes that surveys have been made on a section of 32 miles from Whitefish, Mont., south via Kalispell to Summers, and the surveys are being continued south to Polson, in all about 100 miles. It is expected to begin construction work this summer. Considerable rock work will be carried out on the section along the west shore of Flathead lake, also some tunneling as well as a large amount of trestle work. The organization of the company will be finished in about one month. An extension is projected from a point on the main line about 20 miles north of Polson southwest to Hot Springs, in the Flathead Indian reservation. Joseph Edge, president, and F. E. Marsh, chief engineer, both of Kalispell, Mont.

WICHITA FALLS & NORTHWESTERN.—An officer writes that this company is planning to build a branch from Altus, Okla., west to Wellington, Tex., about 60 miles. The company has secured about 45 miles of the grade built by the Altus, Roswell & El Paso. Two companies have been organized, one covering the Oklahoma line, to be known as the Altus, Wichita Falls & Hollis Railway, and the other, covering the 15 miles from the Oklahoma state line west to Wellington, to be known as the Wichita Falls & Wellington. Both these companies are being financed by the Wichita Falls & Northwestern, and were incorporated to obtain charters in the states of Oklahoma and Texas. The line will be known as the Panhandle division, and will be owned by the same interests as now own the other lines comprising the Wichita Falls Route. Contract has been let for completing the line, which it is expected will be put in operation within six months.

A contract is said to have been signed by this company and residents of Lawton, Okla., for the construction of a branch from Devol, Okla., north to Lawton, 38 miles. The railway company agrees to have the extension finished by September, 1910.

WICHITA FALLS & WELLINGTON.—See Wichita Falls & Northwestern.

Railway Financial News.

CAMAS PRAIRIE.—The Camas Prairie Railroad Company has been formed to operate the line from Lewiston Junction, formerly Texas City, Wash., to Grangeville, Idaho, 150 miles, which is owned jointly by the Oregon Railroad & Navigation Company and the Northern Pacific.

CHICAGO & ALTON.—Kissel, Kinnicut & Co., New York, have bought and resold an issue of \$2,650,000 three year 5 per cent. collateral trust notes of the Chicago & Alton, a portion of which are now being offered in the general market at 99½%. The notes are to be secured by the deposit of \$3,500,000 new equipment and improvement mortgage 5 per cent. bonds, due 1930, authorized last week to the amount of \$18,000,000.

CHICAGO, MILWAUKEE & PUGET SOUND.—This company has taken over and will hereafter operate as part of its own line the property of the Montana Railroad, whose line runs from Lombard, Mont., to Lewistown, 157 miles. The Puget Sound road owns all of the Montana Railroad's \$2,000,000 general mortgage bonds and \$3,500,000 stock.

CINCINNATI, BLUFFTON & CHICAGO.—W. A. Guthrie, a broker of Indianapolis, has petitioned the circuit court at Huntington, Ind., to have the property of this company sold because of the non-payment of receiver's certificates, amounting to \$100,000.

CINCINNATI, HAMILTON & DAYTON.—The first and refunding mortgage 4 per cent. gold bonds recently announced are offered for sale by Kuhn, Loeb & Co. and Speyer & Co., of New York, and the amount offered is \$12,500,000. The price is 91½% and interest, and subscriptions close March 22 or earlier. Principal and interest are guaranteed by the Baltimore & Ohio. The 75 millions of bonds authorized are to be issued as follows:

a For the payment or adjustment of indebtedness, both due and accrued	\$7,500,000
b For improvements now needed.....	5,000,000
c For necessary working capital.....	2,000,000
d For deposit as collateral under \$11,557,000,	
4 per cent. notes due July 1, 1913.....	13,000,000
	\$27,500,000
Reserved for future use:	
e For additions, improvements and betterments.....	\$23,721,000
f For refunding underlying bonds	23,779,000
	47,500,000
	\$75,000,000

The \$12,500,000 now offered constitute \$5,500,000 of the bonds specified under *a* and all of those under *b* and *c*. The remaining \$2,000,000 under *a* (not guaranteed by the B. & O.) were given in lieu of cash for adjustment of indebtedness.

HOCKING VALLEY.—Reports persist and apparently are informally authorized, to the effect that the Hocking Valley system is to be divided between the Chesapeake & Ohio and the Lake Shore & Michigan Southern. It is said that a definite plan has been adopted by which the Chesapeake & Ohio is to take the Hocking Valley proper, the Lake Shore is to take the Toledo & Ohio Central and both companies are to take and operate jointly the Kanawha & Michigan. It will be recalled that some months ago an Ohio court directed the relinquishment of the Toledo & Ohio Central on the ground that its control by the Hocking Valley was contrary to law, in that the Toledo & Ohio Central was parallel to and competing with other lines of the Hocking Valley. The execution of this order was stayed pending an appeal which will be argued next June.

LAKE SHORE & MICHIGAN SOUTHERN.—Four per cent. gold bonds of this company to the amount of \$15,000,000 are offered for sale by J. P. Morgan & Co. at 93½% and accrued interest. These bonds are a part of the issue of \$50,000,000 of 25-year bonds authorized in 1906, and they are due May 1, 1931. Interest is payable May 1 and November 1. Application will be made to list the 15 millions on the New York Stock Exchange. The proceeds of the present sale are to be used to repay funds that were borrowed to pay the 15 millions of three-year 5 per cent. gold notes of 1907, which were payable on the first of last February.

J. P. Morgan & Co. have sold, at 95, the remainder of the first mortgage 4 per cent. 50-year gold bonds of the Jamestown, Franklin & Clearfield. This road is owned by the L. S. & M. S., which guarantees the bonds, principal and interest.

NEW JERSEY & PENNSYLVANIA.—This road, formerly the Rockaway Valley, has been taken out of the hands of the receiver, by order of Vice-Chancellor Emery, of New Jersey, and Receiver Pitney has turned over the affairs of the company to George E. Fisher, treasurer. It is said that the sum of \$15,000 has been secured, and that the road is to be extended from its present northern terminus at Watnong northward about two miles, to a point near the business center of Morristown, N. J.

NORFOLK & SOUTHERN.—The sale of this company's property on December 7 to the bondholders' reorganization committee, for \$8,500,000, has been affirmed by the United States circuit court of appeals. The court decides on all points in favor of the reorganization committee, and against the parties who appealed from the decision of the lower court. It is expected that 5 per cent. first mortgage bonds to the amount of \$5,780,000 will be sold at once to N. W. Harris & Co. and Redmond & Co., and the new organization will be perfected at once, though some of the reports say that the parties opposing the bondholders' committee will take the case to the supreme court if they can find a way to do so.

According to the plan of reorganization a new company will be incorporated with \$16,000,000 capital stock, and \$12,000,000 first mortgage 5 per cent. bonds, secured upon all the property of the company. Stock will be given to the owners of the \$14,000,000 outstanding 5 per cent. bonds, who have deposited them with the reorganization committee, at the rate of \$1,142.80 of stock for each bond. All but 24 of these bonds have been deposited. This exchange will take all of the \$16,000,000 stock authorized. The \$5,780,000 in new bonds will be used to retire \$2,043,893 collateral trust notes, \$1,442,865 receivers' certificates, and \$47,000 Raleigh & Pamlico Sound bonds, and to furnish working capital for the new company. Their sale in the market will not take place until it is known that the syndicate opposing the sale does not intend to apply for a writ of certiorari. The road is said to be now earning 4 per cent. on \$16,000,000 stock.

NORFOLK & WESTERN.—The directors have voted to offer to preferred and common stockholders the privilege of subscribing at par to new 4 per cent. convertible bonds to the extent of 12 per cent. of their holdings of stock. There is now \$66,000,000 common stock outstanding and \$22,991,700 adjustment preferred, so that the new bonds will total between ten and eleven million dollars.

SEABOARD AIR LINE.—There have been sold abroad about \$11,000,000 adjustment 5 per cent. bonds. These bonds are part of the new issue of \$25,000,000 authorized to help the road out of its receivership. Of the amount authorized \$6,345,000 were reserved to be exchanged for the general mortgage 5 per cent. bonds then outstanding, while the remainder, \$18,000,000, were offered to stockholders at 70. They were underwritten by a syndicate of bankers, headed by Blair & Co. and Ladenburg, Thalmann & Co., New York, and Middendorf, Williams & Co., of Baltimore. The bankers' profit is \$1,260,000 less about four months' interest. About \$7,000,000 of the bonds were reserved by the underwriters. By this transaction the way is paved for bringing out a portion of the \$125,000,000 of refunding 4 per cent. bonds, also authorized in the reorganization plan. This issue would be used to retire \$10,000,000 ten-year 5 per cent. collateral trust bonds and \$4,651,000 of three-year collateral trust 5 per cent. bonds, both of which mature on May 1 next.

WICHITA FALLS & NORTHWESTERN.—The unsold portion of the Pan Handle division 5 per cent. gold bonds are being offered for sale at 97 and interest by the National City Bank of Chicago. These bonds are a first lien and the total amount issued was \$900,000. They are due January 1, 1925, but may be called on any interest date at 105.

Supply Trade Section.

The Denver plant of the Griffin Wheel Co., Chicago, was partially destroyed by fire March 8.

The Isthmian Canal Commission will receive bids until March 28 for lumber and steel castings (Circular No. 566), and until April 4 on electrical materials of various kinds (Circular No. 565).

At the annual meeting of the Hobart-Allfree Co., Chicago, March 7, the following officers were elected: President, B. F. Hobart; vice-president and general manager, J. B. Allfree; second vice-president, Frank P. Smith; treasurer, E. H. Allfree, and secretary, W. H. England.

The Commonwealth Edison Co., Chicago, has bought 109 acres of land on which to build new generating stations. One or two stations are to be put up at once; it is planned to build a group of stations to have a combined capacity of about 350,000 horse-power.

The Cutler Hammer Co., Milwaukee, Wis., makes a magnet with which steel cargoes are being rescued from the bed of the Mississippi river. A barge load of kegged nails is now being raised near New Orleans; a load of cotton ties near Natchez and a load of woven wire near Pittsburg will be raised later.

The Electric Storage Battery Company, of Philadelphia, has acquired all the patents and rights of the Westinghouse Storage Battery Company, who owned all the rights of the General Storage Battery Company and the storage battery interests and patents of the Westinghouse Machine Company. The Electric Storage Battery Company will have the sole right to manufacture Westinghouse batteries.

The Western Electric Company reports for the quarter ending February 28 an increase in its sales of 50 per cent. over the corresponding quarter last year. For the month of February the gross sales increased 60 per cent. over the corresponding month last year. Based on these returns and known facts, the company estimates that its total sales for the current year will exceed \$61,000,000. No recent contracts have been of unusual size, but there seems to be a broad and increasing demand for telephones, especially among railways and farmers.

TRADE PUBLICATIONS.

Great Northern.—The Great Northern has issued a folder advertising the first Minnesota Conservation and Agricultural Development Congress to be held at St. Paul, Minn., March 16-19, 1910.

Georgia & Florida Railway.—This road announces the completion of its Vidalia-Hazlehurst extension and the opening of its line from Millen, Ga., to Madison, Fla. A copy of the first folder issued by it has just been received from C. H. Gattis, general passenger agent, Augusta, Ga.

Hardening Furnace.—A cylindrical hardening furnace for heating high-speed steel reamers, tabs, drills, etc., for hardening and suitable for either oil or gas fuel is described in a sheet which is being distributed by the Rockwell Furnace Company, New York. It is part of bulletin G and should be attached to it.

Hydraulic Valves and Fittings.—This is the title of a 120-page catalogue (No. 78) from the Watson-Stillman Company, New York. It is said to be the most complete catalogue of this kind ever issued and contains numerous suggestions as to the best piping arrangements, what types or combinations of valves are best suited for different classes of work, and how a valve arrangement may operate a number of cylinders or machines automatically, etc.

Chicago, Union Pacific & Northwestern.—"London to San Francisco in Ten days" is the title of a four-page folder issued by the Chicago, Union Pacific and Northwestern line. The heading refers to a recent trip from London to San Francisco which was made on a wager in the time mentioned, the

"San Francisco Overland Limited" on the Chicago, Union Pacific & Northwestern line being used for the portion of the trip from Chicago to San Francisco.

Coaling Stations and Briquetting Plants.—The Roberts & Schaefer Company, Chicago, have prepared a number of loose leaves for insertion in their bulletin No. 15, covering the work performed by their railway department during the past year. A number of coaling stations are illustrated, including the following types: Holmen bucket and chain, car haul and single counter-balanced bucket. A coal briquetting plant built for the Standard Briquette Fuel Company, Kansas City, Mo., is illustrated; also the Siamese coal breaker and the Barrett patent revolving measuring feeder for automatically filling a Holmen bucket from the receiving hopper.

RAILWAY STRUCTURES.

ALTAIR, TEX..—A contract is said to have been given to the Weber-Duller Co., Houston, Tex., for the foundation of a bridge for the San Antonio & Aransas Pass, to be built over the Colorado river. The structure will be a pin-connected through span bridge, the span being 276 ft. long. The steel work will be put in place by the Virginia Bridge & Iron Co. and the concrete piling will be put in by the Gulf Concrete Construction Co.

ATLANTA, GA..—The Southern is about to begin work on a freight transfer station at the Inman freight yards in Atlanta similar to the one now in use at Spencer, N. C. At Spencer the company will put up a large boiler shop, to be equipped with modern machinery and tools, and will also put up a large storehouse.

COLFAX, CAL..—According to press reports the Southern Pacific will begin work soon on a roundhouse and machine shops in Colfax.

DES CHUTES, ORE..—According to press reports the Oregon Trunk Line, now building from a point on the Columbia river, near the mouth of the Des Chutes river, south into central Oregon, is asking for bids for a number of bridges, the most important of which will be over the Columbia river, the Celilo canal, the Oregon Railroad & Navigation main line as well as the Portage Railroad. It is said this work will cost between \$1,000,000 and \$1,500,000. The plans provide for a swing bridge over the canal on seven fixed spans. The bill authorizing the construction of the bridge over the canal has been passed by both houses of Congress and signed by the president, and the plans are already in the hands of the war department for approval. There will be three other bridges over the Des Chutes river, one of which is to be at Horseshoe Bend and another at Oxbow. (Nov. 5, p. 897.)

FAIRVIEW, OKLA..—The car and repair shops of the Kansas City, Mexico & Orient were burned March 9. The total loss is estimated at \$100,000.

FORT WAYNE, IND..—An agreement has been reached between the city officials of Fort Wayne, Ind., and the Pennsylvania Company, operating the Pittsburgh, Fort Wayne & Chicago, for the separation of grades at two of the most heavy traffic streets in Fort Wayne and on an intermediate street. This is to be accomplished by raising the railway tracks and depressing the streets. The city of Fort Wayne is to pay a proportion of the cost of the work. In connection with these improvements the Pennsylvania company intends to put up a new passenger station west of Calhoun street, a short distance west of the present station.

HOPKINS, MINN..—See Great Northern under Railway Construction.

KLAMATH FALLS, ORE..—The Southern Pacific has finished its new passenger station of granite and cut stone at a cost of about \$30,000.

MCKEES ROCKS, PA..—According to press reports the Pittsburgh, Chartiers & Youghiogheny has reached an agreement

with the officials of McKees Rocks regarding the elimination of grade crossings. The plans provide that two crossings are to be eliminated and improvements made for an undergrade crossing. At Chartiers avenue the street will be depressed about 3 ft. and the railway tracks are to be elevated.

MINNEDOSA, MAN.—Bids are wanted by Frank Lee, division engineer on the Central division of the Canadian Pacific, at Winnipeg, Man., March 28, for building a station at Minnedosa. Plans at the office of the resident engineer, Brandon, and at the division engineer's office at Winnipeg.

MOBILE, ALA.—The Mobile & Ohio will start work at once improving about 1,000 ft. of dock property between St. Anthony and Adams streets, in Mobile.

NEW ORLEANS, LA.—According to press reports work will be resumed by the New Orleans Terminal Co. on the Chalmette terminals. The damage caused by sinking of some of the concrete piers can be easily repaired.

PHILADELPHIA, PA.—A contract has been given to J. J. Walsh & Son, Baltimore, Md., for putting up a fireproof freight house at Fifty-eighth street and Woodland avenue, in Philadelphia. The building is to be 60 ft. x 20 ft., equipped with rolling steel doors, scales and fire protection. Work on the new building is to be started at once.

RICHMOND, QUE.—According to local reports the Grand Trunk is planning to build a roundhouse in Richmond and make other improvements.

ST. LOUIS, Mo.—An officer of the Rock Island writes regarding the improvements to be made at North St. Louis that the work has not yet been authorized. (March 4, p. 464.)

ST. PAUL, MINN.—It is said that the railways which propose to use the new union passenger station to be built in St. Paul have agreed that there should be 30 tracks in the station. Negotiations will be entered into soon with the harbor commission of St. Paul relative to changing the channel of the Mississippi river to provide enough land to extend the station and provide a site on which to lay the necessary tracks.

SHOREHAM, MINN.—See Great Northern under Railway Construction.

TACOMA, WASH.—Plans are being prepared by the Northern Pacific and bids are to be asked for by W. L. Darling, chief engineer, St. Paul, Minn., to build passenger stations in the state of Washington at the following places: Tottenish, Ritzville, Centralia, Chehalis, Olympia and Kelso. (March 4, p. 464.)

TEMPLE, TEX.—See Temple-Northwestern under Railway Construction.

FOREIGN RAILWAY NOTES.

The Technical High School of Berlin has conferred the degree of Doctor of Engineering on Richard Pintsch in recognition of his services in connection with car lighting and the illumination of buoys.

The Minister's estimates for the Prussian State Railways for the year 1909-1910 indicate a deficit amounting to \$22,000,000, against a deficit of \$46,000,000 the previous year. The Minister insists that tolls must be levied on boats using the canals and the improved rivers.

The International Freight Traffic Agreement, which provides for freight transportation between different European countries, at the end of March last had been accepted by railways of 14 different countries having an aggregate length of 150,230 miles, having begun in 1893 with 94,785 miles.

Henschel & Son, of Cassel, obtained the contract for locomotives for the Argentine Northern Railway, their bid being \$9,925 each (kind not specified), which was \$60 less than the bid of the American Locomotive Co. A French firm, an English firm and Baldwin were also bidders. The highest bid was \$678 more than the lowest.

Late News.

The items in this column were received after the classified departments were closed.

Paul Morton, president of the Equitable Life Assurance Society, New York city, formerly vice-president of the Atchison, Topeka & Santa Fe, and later secretary of the Navy, has been elected vice-president of the Pan-American Railway.

In the Federal Court at Philadelphia, March 16, the grand jury returned indictments against the Lehigh Valley and the Philadelphia & Reading for violation of the Interstate Commerce law in canceling demurrage charges that should have been collected from the Bethlehem Steel Company.

F. B. Harriman, general manager of the Illinois Central, the Yazoo & Mississippi, and the Indianapolis Southern, has resigned, and his duties have been taken over by Vice-President W. L. Park, of these companies. T. J. Foley has been appointed assistant to vice-president of the Illinois Central and the Yazoo & Mississippi Valley, with office at Chicago.

In the United States Circuit Court of Appeals at Richmond, Va., March 16, Judges Goff, Pritchard and Boyd held, in substance, that United States courts have no jurisdiction in matters pertaining to railway rates; the Interstate Commerce Commission has exclusive jurisdiction in such matters. Such is the newspaper report. The decision was reached in the case of the Tennessee Central against the Southern.

At Daytona, Fla., on Wednesday of this week, Barney Oldfield, driving a 200 h.p. Benz automobile, traversed a mile in 27.33 seconds, or at the rate of 131.72 miles an hour. Oldfield took a flying start. From a standing start he traversed the mile in 40.53 seconds. In his first run he beat the best previous record, which was made by Marriott four years ago, by .87 second, and in the second he beat the best previous record by .6 of a second.

In the Federal Court at Louisville, Ky., March 16, the Louisville & Nashville pleaded guilty on ten counts in eight indictments charging the payment of illegal rebates, and Judge Evans imposed a fine of \$1,000 for each count, a total of \$10,000. The eight indictments contained forty-seven counts, but it was admitted that conviction on many of the counts was impossible. Col. Henry L. Stone, counsel for the road, made a statement to the effect that the violations were technical in nature and not willful, and that no moral guilt attached to the company's officials. The remaining thirty-two counts were then dismissed by the court.

The United States Steel Corporation for the year ended December 31, reports an increase in gross receipts of \$164,074,411, as compared with 1908. The volume of business done by the corporation and subsidiary companies as represented by their combined gross sales and earnings equalled the sum of \$646,382,251. The income account for the year shows earnings of all properties after the deduction of operating expenses, including approximately \$35,000,000 for ordinary repairs and maintenance, employees' bonus funds, provisional allowance for corporation excise tax, interest on bonds and fixed charges of subsidiary companies, of \$131,773,100, an increase of \$39,643,703 over 1908, and compares with \$160,964,673 in 1907, \$156,624,273 in 1906 and \$119,787,658 in 1905.

Final contracts were signed this week for the construction of the two large office buildings which are to be put up between Forty-sixth and Forty-eighth streets at the Grand Central station, New York City, on the Lexington avenue side. These buildings are to be owned jointly by the New York Central and the New York, New Haven & Hartford, and it is planned to have them ready for occupancy within a year. When these are finished the "Grand Central Palace," two blocks south, will be vacated and in its place will be built another large building similar to the office building which is now nearly finished. The lower floors of the Grand Central Palace are now in use as the temporary passenger station, the "Lexington avenue terminal." The two buildings now to be built will be 13 stories high, and will be leased to the Merchants' & Manufacturers' Exchange, which will manage the New York Furniture Exchange and other enterprises.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Louisville & Nashville has ordered 25 consolidation locomotives from the Baldwin Locomotive Works.

The Hocking Valley locomotives, specifications for which were given in the *Railway Age Gazette* of March 11, will have Baker-Pilliod valve gear and not Walschaert, as reported.

The Southern Railway is in the market for 75 new locomotives, including passenger, freight and switching engines. The freight engines include two of the Mallet articulated compound type, which will weigh, in working order and including tenders, 520,550 lbs. each. They will be used for heavy freight service.

CAR BUILDING.

The Missouri Pacific is reported in the market for 25 caboose cars.

The Chicago, Milwaukee & St. Paul is said to be in the market for 60 coke cars.

The Chilian States Railway is said to be in the market for 50 thirty-ton and 30 twenty-ton cars.

The Swift Refrigerator Transportation Co. has ordered 50 tank cars from the Pressed Steel Car Co.

The United States Express Co. is reported in the market for 25 refrigerator cars. This is unconfirmed.

The Missouri, Oklahoma & Gulf is said to have ordered 25 tank and 300 coal cars. This item is not confirmed.

The Louisville & Nashville are taking prices on steel underframes for 1,400 freight cars to be built at company shops.

The Crescent Tank Line is said to be in the market for from 100 to 125 tank cars. This item is not confirmed.

The Louisville & Eastern is reported to have ordered three express and five passenger cars. This item is not confirmed.

The Idaho & Washington Northern has ordered one 70-t. McKeen motor car from the McKeen Motor Car Co., Omaha, Neb.

The Southern Pacific is said to be in the market for 75 passenger, 50 chair, 30 baggage and 35 postal cars; all to be of steel.

The New Orleans, Mobile & Chicago has ordered from the American Car & Foundry Co. 100 box and 200 flat cars. Garrett draft gear is to be used in these cars.

The Chicago, Aurora & De Kalb is in the market for eight dump cars of 12 yds. capacity and an electrically-driven gravel unloader, having a capacity of 100 yds. per hour.

The Western Maryland fifty-ton steel hopper cars and forty-ton gondola cars, described in the *Railway Age Gazette* of March 11, have the following special equipment:

Type	Hopper.	Gondola.
Angle cock holder.	Western.	Western.
Bolsters, truck	Scullin-Gallagher.	Simplex.
Brakes	Westinghouse.	Westinghouse.
Brake-beams	Waycott,Damascus	Waycott,Damascus
Brake-Beam Co.		Brake-Beam Co.
Brake-shoes	Am. Brake-Shoe & Foundry Co.	Am. Brake-Shoe & Foundry Co.
Brasses	Nat'l Supply Co.	Nat'l Supply Co.
Couplers	Sharon,Nat'l Mall.	Sharon,Nat'l Mall.
Castings Co.		Castings Co.
Doors.*	Dunham, U. S. Metal & Mfg. Co.	
Draft gear	Farlow.	Farlow.
Journal boxes	McCord.	McCord.
Paint	John Lucas & Co.	John Lucas & Co.
Release rigging	Carmer.	Carmer.
Springs	R'y Steel Spring.	R'y Steel Spring.
Wheels	National Car & Wheel Co.	Standard Steel Car Co.

*Side, drop and grain.

The Southern Railway is in the market for 3,000 all-steel coal cars of 100,000 lbs. capacity, 500 all-steel coke cars of 100,000 lbs. capacity, 150 steel underframe stock cars of 60,000

lbs. capacity, and 10 steel underframe combination passenger and baggage cars. The company is now building for itself, at its Lenoir car works, 1,000 steel underframe ventilated box cars and 200 steel underframe stock cars. It is also building at these works 205 steel underframe ventilated box cars for the Georgia Southern & Florida Railway. Upon the completion of this work, about the first of August, it will commence the construction, for the Southern Railway, of 1,000 additional steel underframe ventilated box cars of 80,000 lbs. capacity. The Lenoir car works are also making car wheels at the rate of 120 per day, and this production is to be steadily increased to 300 per day, the full capacity of the plant.

The Idaho & Washington Northern, as reported in the *Railway Age Gazette* of February 11, has ordered from the Haskell & Barker Car Co. 100 box cars and 100 flats. The company has also ordered six refrigerator cars from the same builders. The box cars have the following dimensions: Inside, length, 40 ft.; width, 8 ft. 6 in.; height, 8 ft. Overall, length, 41 ft.; width, 9 ft. The flats are 41 ft. long and 8 ft. 10 in. wide, overall. The bodies and underframes on all these cars are of wood. Delivery is specified for March, 1910, on the flat cars, and September, 1910, on the box cars.

Special Equipment.

Axes	5 x 9 M. C. B. steel
Bolsters	Simplex
Brakes	Westinghouse
Brake-beams	Simplex and Haskell & Barker
Brake-shoes	Streeter
Brasses	Filled
Couplers	Tower
Draft gear	Williamson-Priest
Dust guards	Wood
Journal boxes	M. C. B. steel
Roof	Williamson-Priest
Side bearings	Simplex
Springs	Coil
Trucks	M. C. B. standard
Wheels	Haskell & Barker 665-lb. cast steel

MACHINERY AND TOOLS.

The Baltimore & Ohio Southwestern will make improvements in its shops at Washington, Ind., to cost about \$61,000. The larger proportion of this will be expended for the machine shop.

The Columbus Railway & Light Co., Columbus, Ohio, has ordered a steam turbo-generator set from the Allis-Chalmers Co., Milwaukee, Wis., for increasing the capacity of its generating plant. It is a 400-k.w., 4,150-volt, three-phase, 60-cycle, 1,800-r.p.m. unit and will receive steam at 160 lbs. and 100 degs. F. superheat.

The Citizens Railway & Light Company, Muscatine, Iowa, has recently added a 750-kilowatt Westinghouse turbo-generator set for its local light, power and railway service. A rotary converter set makes available direct current for the latter purposes. The condensing system is of the Leblanc jet type, manufactured by the Westinghouse Machine Company, East Pittsburgh, Pa.

The American Steel Foundries Company is making some changes in the electrical equipment of its shops at Thurlow, Pa., and is about to install a 200-k.w. induction motor generator set. The alternating current side will receive 2,200-volt, 60-cycle, two-phase current while the output will be 250-volt direct-current. A two-panel switchboard will carry the control instruments. This apparatus will be furnished by Allis-Chalmers Company.

The Pennsylvania Lines West of Pittsburgh have ordered from the Allis-Chalmers Co., Milwaukee, Wis., electric generating units to increase the capacity of the power plant at Conway, Pa., from which current for operating the shops there, and also for railway signal work, is supplied. The new machinery consists of two 750-k.v.a., 3,600-r.p.m., 60-cycle, three-phase, 2,300-volt steam turbo units. The turbines will receive steam at 145 lbs. pressure and 100 deg. superheat. During warm weather they will exhaust into a condenser in which a 28-in. vacuum is maintained. During cold weather steam from the turbines will be used in heating the plant, and a maximum back pressure of about 2 lbs. will be effective on the exhaust end. For exciting the alternators two units are to be supplied. One is a 25-k.w., 120-volt, 260-r.p.m. di-

rect-current generator coupled to an engine. The other is a 25-k.w., 125-volt generator direct-connected to a three-phase, 60-cycle, 2,300-volt, 200-r.p.m. synchronous motor. This motor is rated at 150 k.v.a. and, beside driving the exciter unit, will serve as an electrical condenser and thus improve the power factor of the station. Two 12-k.w. fly-wheel type motor generator sets will be installed in the station for supplying current for the railway signal system. These will each consist of a 12-k.w., 600-volt, shunt-wound generator direct-coupled to a 220-volt, 1,720-r.p.m. induction motor.

IRON AND STEEL.

The Erie is reported in the market for 20,000 kegs of spikes.

The Baltimore & Ohio is in the market for 200 tons of bridge material.

The Soo Line has ordered a bascule bridge of 87 tons from the Chicago Bridge & Iron Co.

The Baltimore & Ohio has ordered 300 tons of bridge material from the American Bridge Co.

The Great Northern has ordered 2,100 tons of bridge steel from the Wisconsin Bridge & Iron Co.

The Western Maryland has ordered 200 tons of bridge material from the American Bridge Co.

The Philadelphia & Reading is taking bids on 1,500 tons for a bridge across the Schuylkill river.

The San Antonio & Aransas Pass has ordered 500 tons of bridge steel from the Virginia Bridge Co.

The Duluth, Missabe & Northern has ordered 600 tons of bridge material from the American Bridge Co.

The New York, New Haven & Hartford is in the market for 800 tons of material for a bridge at New Haven.

The Atlantic Coast Line has ordered 2,600 tons of structural steel from the Virginia Bridge & Iron Co.

The Elgin, Joliet & Eastern has ordered 100 tons for plate girder bridges from the American Bridge Company.

The Cleveland, Cincinnati, Chicago & St. Louis has ordered 600 tons of bridge material from the King Bridge Co.

The New York, New Haven & Hartford has an inquiry for 10,000 tons of 100-lb. and about 5,000 tons of 80-lb. rails.

The Chicago, Burlington & Quincy has ordered 500 tons of bridge material from the McClintic-Marshall Construction Co.

The Chicago, Milwaukee & St. Paul has ordered 200 tons from the Chicago Bridge & Iron Co., and 460 tons from the Worder Alen Co.

The Boston & Maine has ordered 250 tons of bridge material from the American Bridge Co. and 400 tons from the Pennsylvania Steel Co.

The Cincinnati, Hamilton & Dayton has ordered 1,300 tons of bridge material from the American Bridge Co. and 1,200 tons from the McClintic-Marshall Construction Co.

The Southern Railway will order 46,000 tons of steel rails, of which 36,000 tons will be for the Southern Railway proper, and the remainder for the Georgia Southern & Florida, the Virginia & Southwestern, the Mobile & Ohio, the Alabama Great Southern and the Cincinnati, New Orleans & Texas Pacific Railways. The larger part will be ordered from the Tennessee Coal, Iron & Railroad Company.

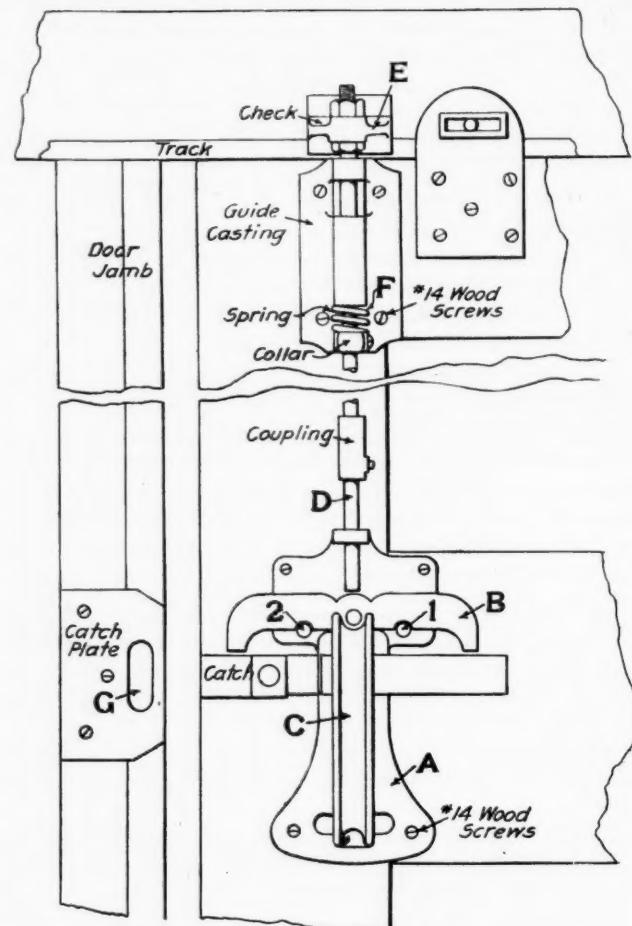
General Conditions.—An encouraging feature is the better demand of the railways for new equipment. Since the first of the month orders have been coming in at a rate close to the capacity of the mills. The strike at the works of the Bethlehem Steel Corporation is practically at an end and the number of employees is increasing daily.

The Swiss State Railways increased their gross earnings 1.7 per cent. and decreased their expenses 2 per cent. in 1909, which resulted in an increase of nearly 9 per cent. in net earnings, amounting to about \$950,000.

Laconia Sliding Door Fastener.

This door fastener is intended for application to the sliding doors of mail, baggage or express cars. Its purpose is to hold such doors in a closed or partially open position and to prevent their moving under the jarring action of the car, or because of sudden stopping or starting.

It consists of a friction slide that is pressed down against the running rail by a stiff spring whenever the door is at rest, but which is lifted out of the way when it is to be moved. It may also be used to lock the door in the closed position. To accomplish this there is a latch support, A, fastened by screws to the door near its edge. This support has two fulcrum studs, 1 and 2, projecting from its face, and carries a latch, B, which rests upon them. This latch is made



Laconia Sliding Door Fastener for Mail Cars.

solid with a handle, C. Now, if this handle is moved to the right or left, the latch, B, will come to a bearing upon one fulcrum or the other and, turning about it, will lift the central portion beneath the rod, D. The upper end of this rod is rigidly attached to and carries the check shoe, E, which rests upon the rail. Ordinarily the rod, D, with the shoe is pushed down against the rail by the spring, F, which seats against a guide casting fastened to the upper part of the door and a collar fastened to the rod.

If the door is to be moved, the latch handle, C, is pulled in the direction of that movement. This relieves the pressure of the shoe on the top of the rail and releases the door, which then moves on the regular sheave rollers. The pressure of the shoe on the rail is dependent upon the stiffness of the spring, so that it may be made to carry any amount up to half the weight of the door.

When closed the latch drops over a catch plate, G, which is fastened to the door-jamb. By holding the latch down with a lock or bolt the door may be locked. It is evident that any type of door rail may be used, and that the fastener may be adapted to any weight of door. The device is in the hands of Irving S. Elliot, Lakeport, New Hampshire.

ANNUAL REPORT.

NEW YORK CENTRAL & HUDSON RIVER RAILROAD CO. FORTY-FIRST ANNUAL REPORT: FOR THE YEAR ENDED DECEMBER 31, 1909.

The Board of Directors herewith submits its report for the year ended December 31, 1909, with statements showing the results for the year and the financial condition of the company. The income account for the year and the various tables of statistics are shown in the form promulgated by the Interstate Commerce Commission and the details of the previous year have been revised for purposes of comparison.

The mileage embraced in the operation of the road is as follows:	
Main line and branches owned.....	805.47 miles
Proprietary lines	3.06 "
*Lines leased	2,617.93 "
Lines operated under contract.....	81.70 "
Trackage rights	273.67 "
Total road operated.....	3,781.83 miles

The slight increase in road mileage operated is due to change of alignment and measurement at various points on the system. A statement showing in detail miles of road and track operated will be found upon another page.

The capital stock authorized and outstanding is as follows:

Authorized to December 31, 1909.....	\$250,000,000.00
There was no change during the year in the amount issued and outstanding, the total on December 31, 1909, being	178,632,000.00

Balance authorized but not issued December 31, 1909..... \$71,368,000.00

The funded debt outstanding on December 31, 1908, was..... \$243,414,845.00

There have been issued and sold during the year Gold mortgage bonds	4,000,000.00
and Gold bonds secured by a mortgage on the Spuyten Duyvil & Port Morris Railroad.....	2,500,000.00

making the total funded debt outstanding on December 31, 1909..... \$249,914,845.00

* The Dunkirk, Allegheny Valley & Pittsburg Railroad, 90.51 miles, is also leased by this company, but its mileage and operations are not included in this report. Separate accounts are kept and independent reports prepared in its behalf.

SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1909.	1908.	Increase or decrease.
OPERATING INCOME.....	3,781.83	3,780.79	1.04 miles.
RAIL OPERATIONS..... miles operated.	miles operated.	miles operated.	1.04 miles.
Revenues	\$93,171,860.69	\$83,927,354.29	\$9,244,506.40
Expenses	64,593,826.35	61,289,304.00	3,304,522.35
NET REVENUE FROM RAIL OPERATIONS	\$28,578,034.34	\$22,638,050.29	\$5,939,984.05
Percentage of expenses to revenue	(69.33%)	(73.03%)	(3.70%)
OUTSIDE OPERATIONS.			
Revenues	\$4,517,996.90	\$3,678,616.47	\$839,380.43
Expenses	4,312,028.96	3,542,495.95	769,533.01
NET REVENUE FROM OUTSIDE OPERATIONS	\$205,967.94	\$136,120.52	\$69,847.42
NET REVENUE FROM ALL OPERATIONS	\$28,784,002.28	\$22,774,170.81	\$6,009,831.47
TAXES ACCRUED	4,434,504.32	4,253,056.64	181,417.68
OPERATING INCOME	\$24,349,497.96	\$18,521,084.17	\$5,828,413.79
OTHER INCOME.			
Joint facilities rents.....	\$1,274,627.35	\$1,160,380.38	\$114,246.97
Miscellaneous rents	506,611.57	880,223.30	373,611.73
Dividends on stocks owned or controlled	7,602,497.79	7,968,785.74	276,287.95
Interest on funded debt owned	577,901.13	499,492.66	78,408.47
Interest on other securities, loans and accounts.....	1,080,595.14	1,352,400.64	271,805.50
Miscellaneous income.....	260,625.88	750,712.97	490,087.09
TOTAL OTHER INCOME..	\$11,392,858.86	\$12,611,995.69	\$1,219,136.83
GROSS CORPORATE INCOME.	\$35,742,356.82	\$31,133,079.86	\$4,609,176.96
DEDUCTIONS FROM GROSS CORPORATE INCOME.			
Rentals of leased lines....	\$9,943,576.81	\$9,708,044.63	\$235,532.18
Hire of equipment:			
Car mileage and per diem balances	959,684.09	1,473,594.49	513,910.40
Interest on equipment trust certificates.....	548,948.26	586,545.01	37,596.75
Joint facilities rents.....	449,441.42	404,479.42	44,962.00
Miscellaneous rents.....	83,057.29	6,159.41	76,897.88
Interest on funded debt.....	8,913,651.53	8,501,964.02	411,687.51
Other interest	940,970.39	1,179,576.33	238,605.94
St. L. & A. Railway: interest, rental, etc.....	74,000.00	138,600.00	64,600.00
N. Y. & Ottawa Railway: interest on bonds.....	58,240.00	58,240.00	
Other deductions	75,366.67	.....	75,366.67
TOTAL DEDUCTIONS FROM GROSS CORPORATE INCOME	\$22,046,936.46	\$22,057,203.31	\$10,266.85
NET CORPORATE INCOME.	\$13,695,420.36	\$9,075,876.55	\$4,619,543.81

NOTE.—Decreases in italics.

	1909.	1908.	Increase or decrease.
DIVIDENDS, four, aggregating 5%	\$8,931,600.00	\$8,931,600.00	.....
SURPLUS FOR THE YEAR	\$4,763,820.36	\$144,276.55	\$4,619,543.81
Balance to credit of profit and loss December 31, 1908.....	\$10,946,870.96		
Surplus for the year ended December 31, 1909.....	4,763,820.36		
Add: Profit on sale of capital stock of Chesapeake & Ohio Railway Co.....	1,354,410.21		
			\$17,065,101.53
Deduct:			
Adjustment of items assumed under various leases.....	\$781,192.15		
Injury claims prior to 1909.....	809,632.45		
Improvement on Boston & Albany Railroad assumed by lessee	48,000.00		
Cancellation of uncollectible charges and sundry adjustments	17,089.26		
			\$1,655,913.86
BALANCE, DECEMBER 31, 1909.....			\$15,409,187.67

The revenues from operation of the properties of the company are now divided into three classes: revenue from transportation, revenue from operations other than transportation and revenue from outside operations.

For the year covered by this report the revenue from transportation was \$92,238,523.28, an increase of \$9,174,703.16; revenue from operations other than transportation was \$933,337.41, an increase of \$69,803.24; revenue from outside operations (connected with, but in addition to transportation by rail) were \$4,517,996.90, an increase of \$839,380.43.

The total gross revenue from all operations was \$97,689,857.59, an increase of \$10,083,886.83.

All sources of revenue from transportation have shown an increase with the exception of the mail service. The United States Government has established a new basis of computing the weight of mail matter, resulting in a diminution of the compensation of this company of approximately 14 per cent. from July 1, 1909.

Freight revenue was \$54,449,281.47, an increase of \$5,888,099.98. The revenue freight carried amounted to 44,171,954 tons, an increase of 5,093,792 tons over last year, and with the exception of the year 1907 reached a higher total than in any other year of the company's history. The average tonnage for the four years, 1905 to 1908, was 43,240,164, so that the traffic for the year 1909 was 931,000 tons above the average of the four best previous years. Large increases show in all mineral and manufacturing products, the decreases in the classified list of commodities being in food stuffs, such as grain, fruits and vegetables, live stock, dressed meats and other packing house products, and dairy products. The largest increases occurred in bituminous coal, lumber and miscellaneous manufactures, while ores, iron and machinery were carried in largely increased quantities.

The revenue from passengers amounted to \$29,001,911.18, an increase of \$2,393,145.37. An increase in the number of local passengers carried of 1,412,711 and an increase of 1,661,266 in commutation passengers carried, with a slight increase in the average distance of travel and in the average receipts per mile, show that the passenger traffic over this company's lines is in a more satisfactory condition than in 1908, during which it suffered from the stagnation caused by the financial panic of the end of the year 1907. The figures of the year compare favorably with those of 1906 and 1907.

The revenue from express traffic was \$4,081,575.49, an increase of \$495,821.82, due to an enlarged volume of business.

The expenses of rail operations amounted to \$64,593,826.35, an increase of \$3,304,522.35. Included in this increase is an augmented charge for renewals of equipment amounting to \$1,366,496.76.

The operating expenses by groups were:

Maintenance of way and structures.....	\$11,494,023.08
Maintenance of equipment.....	15,421,648.21
Traffic expenses.....	2,273,827.68
Transportation expenses	33,309,314.82
General expenses.....	2,095,012.56
Outside operations.....	4,312,028.96

In maintenance of way and structures most of the items show small increases, due not to excessive expenditures this year, but to the comparatively small amount of work done in the months following the financial disturbance at the end of 1907. The only large increases are for ballast, labor on roadway and track, bridge structures and buildings and fixtures.

In maintenance of equipment an increase of \$2,430,231.91 is shown, due mainly to a largely increased cost for repairs of freight cars and the inclusion in this year's expenses of an increase of \$1,366,496.76 for renewals of equipment, consequent on a change of method in handling this account, which was instituted July 1, 1908, since which time this company has charged to renewals of equipment account the full value, less salvage, of all equipment demolished or taken out of service, so that the year 1909 has borne its full proportion of such charges while 1908 had corresponding charges for the last six months only.

Traffic expenses, being those charges incurred in soliciting and procuring traffic outside of its actual movement by rail, amounted to \$2,273,827.68, an increase of \$205,136.27, mainly due to larger payments on account of expenses of fast freight lines and to wider advertising.

The cost of transportation shows decreases in a large majority of the accounts, the most noticeable one being \$436,387.33 in payments for loss and damage to freight. Fuel for locomotives shows a decreased cost of \$310,531.20, partly offset by an increase of \$127,288.50 in the cost of electric power.

General expenses show a small net increase due almost entirely to larger disbursements for law expenses.

In outside operations the net revenue shows an increase of \$69,847.42, the result of an increase of \$839,380.43 in the revenue derived against an increase of \$769,533.01 in the expenses incurred.

The net revenue from all operations amounted to \$28,784,002.28, an increase of \$6,009,831.47.

In deductions from gross corporate income an increase of \$235,532.18 occurred for rentals of leased lines. The rental of the Boston & Albany Railroad increased \$288,777.79, due to the payment of interest for the whole year on \$7,000,000 Improvement bonds and for six month on an additional \$4,500,000 of Improvement bonds.

Interest on bonds of this company shows an increase of \$411,687.51, due to the charge on \$4,000,000 Gold mortgage bonds for a full year, on \$13,000,000 Gold debentures of 1904 for twelve months, as against four months of 1908, and the charge for interest on the Spuyten Duyvil & Port Morris Railroad mortgage bonds from July 21, 1909.

The surplus for the year, after paying a dividend of \$8,931,600, representing 5 per cent upon the capital stock, was \$4,763,820.36.

Extraordinary expenditures during the year were as follows:

For additions to property, charged to cost of road and equipment.....	\$6,216,747.93
For construction work on leased lines and for Grand Central terminal improvement, charged in part against funds provided by lessor companies.....	\$9,389,381.67
Less amount refunded from proceeds of securities of lessor companies.....	7,000,000.00
	2,389,381.67

Total \$8,606,129.60

Details of the above-mentioned expenditures are shown on subsequent pages.

The operation of trains by electricity has been extended to Yonkers on the Hudson River division for trains equipped with the multiple unit system and the necessary work for the extension of electric operation on the Harlem division from Wakefield to North White Plains is rapidly nearing completion.

In pursuance of the plan outlined in last year's report for the consolidation and merger of several electric railway companies into a corporation to be known as the New York State Railways, various exchanges of capital stock have been made with the result that this company's holdings in electric railway corporations now stand as follows:

New York State Railways.....	133,650 shares
Ontario Light & Traction Company.....	600 shares
Rochester Electric Railway Company.....	1,043 shares
Rochester & Suburban Railway Company..	2,404 shares

On October 27, 1909, the board of directors authorized the issue of 446,580 of the 713,680 shares remaining unsold under previous authorizations, to the stockholders of record at 3 o'clock p. m. on Friday, December 10, 1909, to the extent of 25 per cent. of their holdings, the shares so issued to participate in dividends declared after the beginning of the year 1910. On November 3 the Public Service Commission of the Second District of the State of New York approved of the issue, defining the use of the proceeds of the sale of the stock as follows: \$21,966,615.48 for the discharge of a portion of the three-year gold notes of the company maturing February 1, 1910, and the remaining \$22,691,384.52 for the acquisition of property and for the extension and improvement of facilities, of which sum \$9,000,000 may be used for the purchase of new equipment and rolling stock.

On November 10, the board of directors approved a plan, to take effect January 1, 1910, for the retirement and pensioning of employees of the company who, through age or disability, become unable to continue longer in its service. A board of pensions, consisting of eight persons to be appointed annually by the president of the company, was established, and the sum of \$225,000, or such portion thereof as may be necessary, was authorized to be appropriated annually for the payment of pensions. The plan provides that all employees who reach the age of 70 years shall be retired and such of them as have been in the service for at least ten years immediately preceding their retirement shall be pensioned. Those employees who, having been in the service continuously for 20 years, become, in the opinion of the board of pensions, unfit for duty, may be retired and pensioned.

The following appointments have been made during the year: February 1, Frank V. Whiting, claims attorney; April 28, Edward F. Stephenson, assistant secretary; October 11, F. Breakey Freeman, chief engineer of Boston & Albany Railroad; October 20, Julius W. Pfau, engineer of construction.

William H. Newman, who had been president of this company from June 3, 1901, resigned February 1, 1909, and William C. Brown, who had been vice-president from January 4, 1902, bearing the title of senior vice-president from May 18, 1906, was elected president on January 27. Samuel F. Barger, who had been a director of this company from November 1, 1869, and Charles C. Clarke, who had been a director since May 4, 1883, and first vice-president from the same date until November 9, 1900, resigned from the board, and their places were filled by William C. Brown and Edward H. Harriman. Mr. Harriman died on September 9, and Marvin Hughitt was elected a director on October 13, 1909, to complete the board.

The relations of the road with its patrons and the communities served by it have been harmonious and pleasant.

This mutually satisfactory condition has been fostered and encouraged by the efforts of the Public Service Commission in New York State and the Massachusetts Board of Railroad Commissioners, in composing and adjusting differences which, handled with less wisdom and moderation, might have resulted in serious friction and controversy. The influence and the co-operation of these Commissions have been uniformly beneficial to the road, and have done much to improve the service for the public.

Does not this very desirable result emphasize the advantage of appointing to positions so vitally affecting every business interest of the country, men qualified by experience, temperament and ability to discharge the important duties of their office? Governmental regulation of railroads, within proper limitations, is of benefit to the public, to the railroads and to those who hold their securities; but, in order to secure the maximum benefit for all interests, it is important that men selected for these positions should possess the necessary natural breadth and ability, and in addition thereto a willingness to undertake the conscientious, painstaking study of conditions necessary to enable them to deal intelligently with the complex and delicate questions affecting transportation that are constantly arising.

General conditions were never more favorable, and every visible indication points to renewed and increasing prosperity for the country at large, in which the railroads may hope to participate.

The business of the road shows steady increase; and expenditures which have been made for improvements, adding to efficiency and economy of operation, should be reflected in increased net revenue.

Appreciative acknowledgment is made of the faithful, efficient performance of duty by employees in every department of the service during the year.

WILLIAM C. BROWN,

President.

EQUIPMENT.		
Including Equipment of Leased Lines.		
	1909	1908
Locomotives	1,858	1,924
Cars in passenger service.....	2,365	2,326
Cars in freight service.....	61,858	62,843
Cars in company's service.....	3,670	3,505
Marine department vessels:		
Total floating equipment.....	257	256
Total ledger value of fleet.....	\$2,853,964.84	\$2,282,327.15
Leased Under Equipment Trust.		
Locomotives	447	437
Cars in passenger service.....	88	88
Cars in freight service.....	3,980	3,989
Summary of Equipment in Service.		
Locomotives	2,305	2,361
Cars in passenger service.....	2,453	2,414
Cars in freight service.....	65,838	66,832
Cars in company's service.....	3,670	3,505
Vessels in marine department service....	257	256

TRAFFIC STATISTICS.			
	1909.	1908.	
Freight		Increase or decrease.	
Tons of revenue freight carried	44,171,954	39,078,162	5,093,792
Tons of company freight carried	6,924,084	6,240,311	683,773
Total tons of freight carried	51,096,038	45,318,473	5,777,565
Tons of revenue freight carried one mile.....	8,622,952,658	7,784,641,505	845,311,153
Tons of company freight carried one mile.....	1,244,696,813	1,151,277,700	93,419,113
Total tons of freight carried one mile.....	9,874,649,471	8,935,919,205	938,730,266
Miles of road operated in freight service.....	3,766.65	3,765.61	1.04
Tons of revenue freight carried one mile per mile of road	2,291,148	2,067,299	223,849
Tons of freight carried one mile per mile of road	2,621,600	2,373,034	248,566
Average distance haul of one ton of revenue freight	195.37	199.21	.84
Average distance haul of one ton, all freight.....	198.26	197.18	.92
Average number of tons of revenue freight per train mile	404.42	384.49	19.93
Average number of tons all freight per train mile	462.75	441.36	21.39
Average number of tons of revenue freight per loaded car mile	16.30	16.58	.28
Average number of tons all freight per loaded car mile	18.66	19.03	.37
Average number of freight cars per train mile	37.52	36.26	1.26
Average number of loaded cars per train mile	24.81	23.19	.62
Average number of empty cars per train mile	11.71	12.06	.35
Total freight revenue.....	\$54,449,281.47	\$48,561,181.49	\$5,888,099.98
Average amount received for each ton of freight	\$1.23	\$1.24	\$0.01
Average revenue per ton per mile	mills 6.54	mills 6.24	mills 0.30
Average revenue per mile of road	\$14,455.63	\$12,895.97	\$1,559.66
Average revenue per train mile	\$2.55	\$2.40	\$.15
Passenger			
Number of interline passengers carried	3,016,069	2,794,731	221,338
Number of passengers carried	29,125,834	27,713,123	1,412,711
Number of commutation passengers carried.....	13,703,165	12,041,899	1,661,266
Total number of revenue passengers carried.....	45,845,068	42,549,753	3,295,315
Total number of revenue passengers carried one mile	1,658,878,092	1,526,259,276	132,618,816
Miles of road operated in passenger service.....	3,494.04	3,506.06	.12
Number of revenue passengers carried one mile per mile of road.....	474,774	435,320	39,454
Average distance each revenue passenger carried	36.18	35.87	.31
Average number of passengers per train mile	66	63	3
Average number of passengers per car mile	16	16	
Average number of passenger cars per train mile	6	6	
Total passenger revenue.....	\$29,001,911.18	\$26,608,765.81	\$2,393,145.37
Average amount received from each passenger	cents 63.26	cents 62.54	cents .72
Average revenue per passenger per mile	cents 1.748	cents 1.743	cents .005
Total passenger service train revenue.....	\$36,552,882.35	\$33,678,714.18	\$2,874,168.17
Average passenger service train revenue per mile of road	\$10,461.50	\$9,605.86	\$855.64
Average passenger service train revenue per train mile	\$1.44	\$1.39	\$.05
Total Traffic.			
Operating revenue	\$93,171,860.69	\$83,927,345.29	\$9,244,506.40
Operating expenses	64,593,826.35	61,289,304.00	3,304,522.35
Net operating revenue... ..	28,578,034.34	22,638,050.29	5,939,981.05

NOTE.—Decreases in *italics*.

	1909.	1908.	Increase or decrease.	Assets.—(Continued).	
Operating revenue per mile of road.....	\$24,636.71	\$22,198.36	\$2,438.35	Other permanent investments	\$10,918,680.99
Operating expenses per mile of road.....	17,080.04	16,210.71	869.33	Cash and current assets	80,099,312.80
Net operating revenue per mile of road.....	7,556.67	5,987.65	1,569.02	Deferred assets	48,467,359.52
Operating revenue per train mile.....	2.00	1.89	11	Total assets	\$495,108,850.06
Operating expenses per train mile.....	1.39	1.38	01	 <i>Liabilities.</i>	
Net operating revenue per train mile.....	61	51	10	Capital stock	178,632,000.00
				Mortgage, bonded and secured debt	275,064,845.00
CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1909.				Working liabilities	17,350,370.13
<i>Assets.</i>				Deferred credit items	7,487,271.08
Cost of Road and equipment	\$229,056,160.52			Reserves for replacement of property	20,811.70
Securities owned	126,567,336.23			Additions to property through income since June 30, 1907	1,144,364.48
				Profit and loss; surplus	15,409,187.67
				Total liabilities	\$495,108,850.06

**FORTIETH ANNUAL REPORT, LAKE SHORE & MICHIGAN SOUTHERN RAILWAY COMPANY: FOR THE YEAR
ENDED DECEMBER 31, 1909.**

To the Stockholders of

THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY COMPANY:
The Board of Directors herewith submits its report for the year ended December 31st, 1909, with statements showing the results for the year and the financial condition of the company.

The mileage embraced in the operation of the road is as follows:

	Miles
Main line and branches.....	870.89
Proprietary lines.....	215.57
Leased lines.....	488.50
Trackage rights.....	87.83
Total.....	1,622.79

The miles of road operated has increased during the years as follows:

Leased lines increased.....	72.46
Trackage rights increased.....	84.50
Proprietary lines decreased.....	5.27

Net increase.....	151.69
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A statement showing in detail the miles of road and track operated will be found upon another page.
There was no change in capital stock during the year, the amount authorized and outstanding December 31st, 1909, being \$50,000,000.00
There has been no change in the funded debt of the company, the amount outstanding December 31st, 1909, being \$135,400,000.00

SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1909.	1908.	Increase or decrease.
OPERATING INCOME.....	1,662.79	1,511.10	151.69
RAIL OPERATIONS miles operated. miles operated. miles operated.			
Revenues	\$45,110,997.15	\$39,066,941.55	\$6,044,055.60
Expenses	28,023,661.04	25,206,504.44	2,817,156.60

NET REVENUE FROM RAIL OPERATIONS	\$17,087,336.11	\$13,860,437.11	\$3,226,899.00
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Percentage of expenses to revenues.....	(62.12%)	(64.52%)	(2.40%)
OUTSIDE OPERATIONS.			
Revenues	\$422,399.56	\$326,581.91	\$95,817.65

Expenses	501,306.73	334,392.10	166,914.63
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NET DEFICIT FROM OUTSIDE OPERATIONS.....	\$78,907.17	\$7,810.19	\$71,096.98
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NET REVENUE FROM ALL OPERATIONS	\$17,008,428.94	\$13,852,626.92	\$3,155,802.02
TAXES ACCRUED	1,458,905.00	1,433,646.68	25,258.32

OPERATING INCOME.....	\$15,549,523.94	\$12,418,980.24	\$3,130,543.70
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OTHER INCOME.			
Joint facilities rents	\$381,596.15	\$289,975.67	\$91,620.48
Miscellaneous rents	43,070.37	114,438.56	71,368.19
Dividends on stocks owned or controlled	4,550,205.62	3,126,758.17	1,423,447.45
Interest on funded debt owned	231,310.00	241,091.32	9,781.32
Interest on other securities, loans and accounts	1,268,721.45	1,321,966.13	53,244.68
Miscellaneous income	11,983.69	2,850.86	9,132.83

TOTAL OTHER INCOME..	\$6,486,887.28	\$5,097,080.71	\$1,389,806.57
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GROSS CORP'TE INCOME	\$22,036,411.22	\$17,516,060.95	\$4,520,350.27
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DEDUCTIONS FROM GROSS CORPORATE INCOME.			
Rentals of leased lines....	\$1,858,691.23	\$1,100,381.87	\$758,309.36

Hire or equipment:			
Car mileage and per diem balances	272,621.06	601,200.38	328,579.32

Interest on equipment trust certificates	309,331.46	289,225.42	20,106.04
Joint facilities rents.....	277,237.45	245,347.55	31,889.90

Miscellaneous rents	5,051.46	6,701.92	1,650.46
Interest on funded debt....	5,920,000.00	5,920,000.00	

Other interest	75,181.93	179,415.86	104,233.93
Dividend on guaranteed stock	64,020.00	64,020.00	

Additions and betterments Additional equipment.....	1,263,186.28	1,433,567.61	1,263,186.28
Other deductions	336,728.52	336,728.52	

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NOTE.—Decreases in *italics*.

	1909.	1908.	Increase or decrease.
TOTAL DEDUCTIONS FROM GROSS CORP'TE INCOME	\$10,382,049.39	\$9,839,860.61	\$542,188.78
NET CORPORATE INCOME	\$11,654,361.83	\$7,676,200.34	\$3,978,161.49
DIVIDENDS, TWO, AGGREGATING 12%.....	5,935,980.00	5,935,980.00	
SURPLUS FOR THE YEAR.....	\$5,718,381.83	\$1,740,220.34	\$3,987,161.49
From the surplus for the year.....			
there was deducted:			
Net loss in adjustment of sundry accounts			68,211.92
Amount to the credit of profit and loss, December 31, 1908			\$5,650,169.91
			21,515,868.19
Balance December 31, 1909.....			\$27,166,038.10

The operating revenues for the year were \$45,110,997.15, an increase of \$6,044,053.60 as compared with last year.

Revenue derived from transportation of freight amounted to \$29,735,276.62, an increase of \$4,697,172.90, due to improved business conditions during the year, and a resulting increase in tonnage handled.

Passenger revenue was \$10,154,220.17, an increase of \$1,080,551.41, due to a substantial improvement in passenger traffic, and a greater number of passengers carried.

The revenue from transportation of mails was \$2,124,186.70, a decrease of \$64,028.39.

The revenue from express traffic was \$1,502,022.08, an increase of \$41,618.34.

Other passenger train revenue including excess baggage and milk, amounted to \$637,924.21, an increase of \$152,898.83.

Switching and other transportation revenue amounted to \$604,181.99, an increase of \$91,139.54, due principally to larger receipts from switching.

Revenues other than from transportation were \$353,185.38, an increase of \$44,702.97, due principally to larger revenue derived from rents of buildings and other property.

The operating expenses for the year amounted to \$28,023,661.04, an increase of \$2,817,156.60.

Maintenance of way and structures increased \$672,079.12. The resumption during the year of important improvement work, consisting of four tracking the main line, strengthening and rebuilding bridges, additional ballasting, etc., made necessary heavy charges to maintenance to provide for changes to existing roadway and structures.

Maintenance of equipment increased \$1,358,728.50, due to the large amount and extensive use of equipment in service during the year.

Traffic expenses increased \$123,056.37, due principally to a larger cost to this company in maintaining fast freight lines and outside agencies.

Transportation expenses increased \$634,869.80, due to heavier volume of traffic handled, affecting largely station and train service.

General expenses increased \$28,422.81.

Outside operations show a loss for the year of \$78,907.17, due to a deficit in the operation of dining cars and commercial ice supply plants.

Taxes accrued increased \$25,258.32.

Other income for the year amounted to \$6,486,887.28, an increase of \$1,389,806.57, due to additional revenue received from dividends on stocks owned and rental of joint facilities.

Deductions from gross corporate income amounted to \$10,382,049.39, an increase of \$542,188.78.

Rentals of leased lines increased \$758,309.36, due to a larger rental paid Mahoning Coal Railroad Company on account of increase in traffic handled over that road, and rental paid to Jamestown, Franklin & Clearfield Railroad Company.

Other deductions increased \$336,728.52, due to amount paid to the Indiana Harbor Belt Railroad Company as this company's proportion of its deficit from operation.

From the net corporate income of the company for the year, amounting to \$11,654,361.83, two dividends, aggregating 12 per cent, amounting to \$5,935,980.00, were paid, leaving a surplus for the year of \$5,718,381.83.

Additions and betterments to the property during the current year were \$3,564,414.00, the full amount of which was charged direct to capital account. By the elimination of this expense from charges to "Income" in 1909, that account shows a decrease in additions and betterments to the extent of \$1,433,567.61, the amount charged to such account in the previous year.

Expenditures for new equipment purchased during the year, including this company's equity in the New York Central Lines equipment trust of 1907, were as follows:

20 Freight locomotives .....	.....	\$336,617.96
25 Passenger coaches .....	.....	278,302.04
2 Dining cars .....	.....	32,808.21
2 Cafeteria cars .....	.....	28,553.78
4 Postal cars .....	.....	40,108.03
1,000 Self-clearing steel gond		

Second instalment of 1907 Equipment Trust	\$447,226.18
	<u>\$2,209,495.40</u>
Of the total expenditures as above there was charged to Replacement Fund the sum of. \$946,309.12 and against Income the sum of..... 1,263,186.28	
Total	<u>\$2,209,495.40</u>

The company acquired through lease, dated April 1, 1909, the entire railroad and property of the Jamestown, Franklin & Clearfield Railroad Company, extending from the Ohio-Pennsylvania State Line to Oil City, Pennsylvania, and from Polk Junction to Brookville, Pennsylvania—the latter part of the road being under construction at date of lease, and opened for operation on September 26, 1909.

In connection with the opening of the above line, trackage rights were acquired over the tracks of the Pennsylvania Railroad between Brookville and Falls Creek, Pennsylvania, and over the tracks of the Buffalo, Rochester & Pittsburgh Railroad between Falls Creek and Clearfield, Pennsylvania, forming a connection with the New York Central & Hudson River Railroad at the latter point—thereby giving the company a direct line from the coal fields of Central Pennsylvania to the port of Ashtabula on Lake Erie. The above largely accounts for the increase in mileage of leased lines and trackage rights.

The company exchanged during the year all of its holdings of the capital stock of the Central Trunk Railway Company, the Franklin & Clearfield Railroad Company, the Jackson Coal Railroad Company and the Jamestown & Franklin Railroad Company for a like amount of the capital stock of the Jamestown, Franklin & Clearfield Railroad Company, the latter company being a consolidation of the four former-named companies, and in addition thereto the company acquired through purchase 2,535 shares of the capital stock of the Jamestown, Franklin & Clearfield Railroad Company, and received in reimbursement for advances made to that company for construction purposes \$11,000,000.00 of its first mortgage 4 per cent. bonds.

There were also purchased during the year 35,000 shares of stock of the Cleveland Short Line Railway Company, 50,001 shares of stock of the Pittsburgh & Lake Erie Railroad Company and \$884,000.00 of the Lake Shore & Michigan Southern Railway Company's three year, 5 per cent. gold notes of 1907.

There were acquired through exchange \$507,000.00 of bonds of the Chicago, Kalamazoo & Saginaw Railway Company, for which this company relinquished 1,800 shares of the preferred stock and a promissory note of that company.

On November 10 the Board of Directors approved a plan, to take effect January 1, 1910, for the retirement and pensioning of employees of the company who, through age or disability, become unable to continue in its service. A Board of Pensions, consisting of eight persons to be appointed annually by the President of the company, was established and the sum of \$85,000.00, or such smaller amount as may be necessary, was authorized to be appropriated annually for the payment of pensions. The plan provides that all employees who reach the age of seventy years shall be retired, and that such of them as have been in the service for at least ten years immediately preceding their retirement shall be pensioned. Those employees who, having been in the service continuously for twenty years, become, in the opinion of the Board of Pensions, unsuited for duty may be retired and pensioned.

The summary of financial operations affecting income and detailed exhibits of operating revenues, expenses, etc., are compiled in accordance with the recent classifications promulgated by the Interstate Commerce Commission.

On January 1 Mr. Herbert D. Howe was appointed General Land and Tax Agent and Mr. Ora E. Butterfield was appointed Assistant General Solicitor of the company.

On February 1 Mr. William C. Brown was elected President of the company.

On May 1 Mr. Edward F. Stephenson was appointed Assistant Secretary of the company.

On August 1 Mr. George M. Glazier was appointed Assistant Auditor and Mr. George F. Tomlinson was appointed Auditor of Disbursements of the company.

On November 1 Mr. Newton D. Doughman was appointed Assistant General Attorney of the company.

General conditions were never more favorable, and every visible indication points to renewed and increasing prosperity for the country at large, in which the railroads may hope to participate.

The business of the road shows steady increase, and expenditures which have been made for improvements, adding to efficiency and economy of operation, should be reflected in increased net revenue.

Appreciative acknowledgment is made of the faithful, efficient performance of duty by employees in every department of the service during the year.

WILLIAM C. BROWN,
President.

CAPITALIZATION.

Capital Stock.

Number of shares issued—Common 494,665
Number of shares issued—Guaranteed 10 per cent..... 5,335

Total number of shares outstanding..... 500,000
Number of shares authorized..... 500,000
Total par value issued and outstanding..... \$50,000,000.00
Total par value authorized..... \$50,000,000.00
Par value per share..... \$100.00
Amount of capital stock per mile of road owned (870.89 miles), \$57,412.53.

Funded Debt.

Class of bond.	Date of issue.	Date of maturity.	Payable
Gold mortgage	1897	June 1, 1997	on the first days of December and June
Gold bonds	1903	Sept. 1, 1928	March and September
Gold bonds	1906	May 1, 1931	November and May
Amount of authorized issue.	Issued and now outstanding.	Rate of interest.	on the first days of December and June
\$50,000,000.00	\$50,000,000.00	3 1/2%	December and June
50,000,000.00	50,000,000.00	4 %	March and September
50,000,000.00	35,000,000.00	4 %	November and May

Bonds of Other Roads Assumed by This Company.

Kalamazoo & White Pigeon..... 1890 Jan. 1, 1940
400,000.00 400,000.00 5 % January and July
Amount of funded debt per mile of road owned (870.89 miles), excluding Kalamazoo & White Pigeon bonds, \$155,013.83.

CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1909.

Assets.

Property owned as investment..... \$108,491,192.95

Cash	\$13,998,004.31
Marketable securities	95,525,939.25
Loans and bills receivable.....	3,952,915.88
Net traffic, car mileage and per diem balance	793,191.73
Net balance due from agents and contractors	592,342.61
Miscellaneous accounts receivable.....	8,450,106.01
Materials and supplies	3,684,439.41
Other working assets.....	375,206.76
	127,372,146.96
Deferred debit items.....	10,857,528.20

Total assets \$246,720,868.11

Liabilities.

Stock \$50,000,000.00

Mortgage, bonded and secured debt..... 150,400,000.00

Working liabilities

Dividends declared and interest and rents accrued, not due

Deferred credit items

Additions to property through income since June 30, 1907

Profit and loss—surplus

Total liabilities \$246,720,868.11

STOCKS AND BONDS OWNED.

Stocks.

	Number of shares	Total par value
Battle Creek & Sturgis Railway Co.	825	\$ 82,500.00
Chicago, Indiana & Southern Railroad Co. pf.	50,000	5,000,000.00
Chicago, Indiana & Southern Railroad Co.	120,000	12,000,000.00
Chicago, Kalamazoo & Saginaw Railway Co.	1,800	180,000.00
Cleveland, Cincinnati, Chicago & St. Louis Railway Co.	302,077	30,207,700.00
Cleveland Short Line Railway Co.	37,500	3,750,000.00
Detroit & Chicago Railroad Co.	10,000	1,000,000.00
Detroit, Monroe & Toledo Railroad Co.	4,141	414,100.00
Detroit, Toledo & Milwaukee Railroad Co.	7,500	750,000.00
Detroit Terminal Railroad Co.	933	93,300.00
Elkhart & Western Railroad Co.	4,598	229,900.00
Fairport & Phalanx Railroad Co.	10	1,000.00
Hocking Valley Railway Co.	11,540	1,154,000.00
Indiana Harbor Belt Railway Co.	12,250	1,225,000.00
Jamestown, Franklin & Clearfield Railroad Co.	29,945 1/2	2,994,550.00
Jefferson Coal Co.	5,100	510,000.00
Kalamazoo & White Pigeon Railroad Co.	2,309	230,900.00
Lake Erie, Alliance & Wheeling Railroad Co.	30,000	3,000,000.00
Lake Erie & Pittsburg Railway Co.	50	5,000.00
Lake Erie & Western Railroad Co. pf.	59,300	5,930,000.00
Lake Erie & Western Railroad Co.	59,400	5,940,000.00
Lake Shore & Michigan Southern Railway Co.	39	3,900.00
Lansing Transit Railway Co.	10	1,000.00
Mahoning Coal Railroad Co. pf.	7,990	899,500.00
Mahoning Coal Railroad Co.	17,318	865,900.00
Mahoning State Line Railroad Co.	12	600.00
Merchants Despatch Transportation Co.	23,335	2,333,500.00
New York, Chicago, & St. Louis Railroad Co. 1st pf.	25,030	2,503,000.00
New York, Chicago & St. Louis Railroad Co. 2d pf.	62,750	6,275,000.00
New York, Chicago & St. Louis Railroad Co.	62,400	6,240,000.00
Northern Central Michigan Railroad Co.	5,985	598,500.00
Pittsburgh & Lake Erie Railroad Co.	150,003	7,500,150.00
Reading Company 1st pf.	121,300	6,065,000.00
Reading Company 2d pf.	285,300	14,265,000.00
Reading Company	200,050	10,002,500.00
Sturgis, Goshen & St. Louis Railway Co.	3,000	300,000.00
Swan Creek Railway Co.	400	40,000.00
Taylor Street Warehouse Co.	100	10,000.00
Terminal Railway of Buffalo.	5,000	500,000.00
Toledo Terminal Railroad Co.	4,800	480,000.00
Westinghouse Electric Manufacturing Co.	6	300.00
		\$133,081,800.00

Bonds.

Total amount held

Chicago, Kalamazoo & Saginaw Railway Co. First mortgage	\$ 507,000.00
Elkhart & Western Railroad Co. First mortgage	200,000.00
Jamestown, Franklin & Clearfield Railroad Co. First mortgage	11,000,000.00
Terminal Railway of Buffalo First mortgage	500,000.00
Total par value bonds	\$ 12,207,000.00
Grand total par value stock and bonds	\$145,288,800.00

The above securities are carried on the books of the company at a total value of \$101,607,272.58.

FREIGHT.

	1909.	1908.	Increase or decrease.
Tons of revenue freight carried	33,080,566	26,212,378	6,868,188
Tons of company freight carried	3,821,702	3,053,484	768,218
Total tons of freight carried	36,902,268	29,265,862	7,636,406
Tons of revenue freight carried one mile.....	5,736,452,739	4,851,849,036	884,603,703
Tons of company freight carried one mile.....	279,385,464	227,072,584	52,312,880

NOTE.—Decreases in *italics*.

	1909.	1908.	Increase or decrease.		1909.	1908.	Increase or decrease.
Total tons of freight carried one mile.....	6,015,838,203	5,078,921,620	936,916,583		Total number of revenue passengers carried one mile	\$558,647,351	\$491,518,018
Miles of road operated in freight service.....	1,543.73	1,511.10	32.63		Total number of revenue passengers carried	8,984,781	8,558,345
Tons of revenue freight carried one mile per mile of road	3,715,969	3,210,806	505,163	Number of revenue passengers carried one mile per mile of road	368,450	321,296	
Tons all freight carried one mile per mile of road.....	3,896,950	3,361,076	535,874	Average distance each revenue passenger carried..	62.18	57.43	
Average distance haul of one ton of revenue freight.....	173.4	185.1	11.7	Average number of passenger per train mile	64.59	60.89	
Average distance haul of one ton all freight.....	163.0	173.5	10.5	Average number of passengers per car mile	16.18	16.86	
Average number of tons of revenue freight per train mile	624.2	586.7	37.5	Average number of passenger cars per train mile	6.99	6.55	
Average number of tons all freight per train mile	654.6	614.2	40.4	Total passenger revenue.....\$10,154,220.17	\$9,073,668.76	\$1,080,551.41	
Average number of tons of revenue freight per loaded car mile.....	20.2	19.7	.5	Average amount received from each passenger.....	\$1.13	\$1.06	
Average number of tons all freight per loaded car mile	21.1	20.6	.5	Average revenue per passenger per mile.....cts. 1.818	cts. 1.846	cts. 0.028	
Average number of freight cars per train mile.....	46.6	46.0	.6	Total passenger service train revenue	\$14,418,353.16	\$13,207,312.97	
Average number of loaded cars per train mile.....	31.0	29.8	1.2	Average passenger service train revenue per mile of road	\$9,509.47	\$8,633.36	
Average number of empty cars per train mile.....	14.6	15.2	.6	Average passenger service train revenue per train mile	\$1.67	\$1.64	
Total freight revenue.....\$29,735,276.62	\$25,038,103.72	\$4,697,172.90					
Average amount received for each ton of freight.....	cts. 89.9	cts. 95.5	cts. 5.6				
Average revenue per ton per mile	cts. 0.518	cts. 0.516	cts. 0.002				
Average revenue per mile of road	\$19,261.97	\$16,569.46	\$2,692.51				
Average revenue per train mile	\$3.24	\$3.03	\$0.21				
PASSENGER.							
Number of interline passengers carried	1,244,806	1,072,719	172,087				
Number of local passengers carried	7,739,975	7,485,626	254,349				
Miles of road operated in passenger service	1,516.21	1,529.80	13.59				

NOTE.—Decreases in *italics*.

SIXTY-FOURTH ANNUAL REPORT, MICHIGAN CENTRAL RAILROAD COMPANY: FOR THE YEAR ENDED DECEMBER 31, 1909.

To the stockholders of the Michigan Central Railroad Company:

The Board of Directors herewith submits its report for the year ended December 31, 1909, with statements showing the results for the year and the financial condition of the company.

All revenues, operating expenses, other income, and train and engine mileage, for the year ended December 31, 1909, are stated in accordance with the classifications required by the Interstate Commerce Commission, effective July 1, 1908, and the general balance sheet in accordance with classification and order effective July 1, 1909.

The report covers the operation of the following mileage:

	Miles.
Main line	270.07
Proprietary lines	345.05
Leased lines	1,117.34
Lines operated under trackage rights	14.00
Total road operated	1,746.46

A statement showing in detail the miles of road and track operated will be found upon another page.

There was no change in capital stock during the year, the amount authorized and outstanding being

The funded debt outstanding December 31, 1908—including Three-year 5% Gold Notes issued February 1, 1907—was

It has been increased during the year ended December 31, 1909, as follows:

Michigan Central—Jackson, Lansing & Saginaw three and one-half per cent. gold bonds of 1951 purchased and canceled by the Trustees of the Land Grant Fund of the Jackson, Lansing & Saginaw Railroad Company

Michigan Central-Grand River Valley six per cent. bonds maturing September 1, 1909, surrendered and paid.....

(The \$1,500,000.00 of this company's six per cent. bonds secured by mortgage executed by this company and the Grand River Valley Railroad Company matured September 1, 1909, and will be refunded by the issue of \$1,500,000.00 of new fifty year four per cent. bonds out of a total authorized issue of \$4,500,000.00 of bonds similarly secured.)

During the year there were issued out of an authorized total of \$25,000,000.00, twenty year four per cent. gold debentures, provided for in an indenture made between this company and Guaranty Trust Company of New York dated April 1, 1909

Total funded debt December 31, 1909 (detail on another page)

The charges in cost of road and equipment account were as follows:

Amount charged account Main line to December 31, 1908

There was charged for additions and betterments in 1909:

Against capital account.....\$1,069,702.64

Against income account (equipment)

548,924.72 1,618,627.36

Additions and betterments charged to income June 30, 1907, to December 31, 1908 (set up as required by Interstate Commerce Commission)

1,129,103.84 \$37,960,988.29

Amount charged account Leased Lines to December 31, 1908

\$14,245,038.87

There was charged for additions and betterments against capital account during 1909

872,734.29

Additions and betterments charged to income June 30, 1907, to December 31, 1908

503,518.30 15,621,291.46

Total to December 31, 1909.... \$53,582,279.75

The charges for new equipment during the year amounted in total to \$1,443,041.06, disposed of as follows:

Charged to capital account as set forth elsewhere in detail

\$894,116.34

Charged to income:

Payments account trust equipment... \$988,699.55

Less—replacement and reserve funds— 430,774.83

Balance—additions and betterments... 548,924.72

Total

\$1,443,041.06

Full particulars regarding the equipment acquired and rental paid under the terms of the New York Central Lines Equipment Trust Agreement and Lease of 1907 will be found on another page.

The Detroit Belt Line Railroad, which owns a valuable terminal and connecting railroad in the City of Detroit, Michigan, was organized May 18, 1909. This company owns the entire capital stock thereof, amounting to \$100,000, and under agreement dated July 20, 1909, operates the road.

The construction of the double tube tunnel under and across the Detroit River by the Detroit River Tunnel Company, the entire capital stock of which latter company is owned by this company, has progressed almost to completion. The open cuts and approaches on both sides of the river are finished, and the tunnel under the river is finished so far as to be open for use for the purposes of construction. There remains only to be completed a portion of the interior lining of the sub-aqueous tunnel and the tracks and electrification work. It is expected that the tunnel can be put into use during the early part of 1910.

An arrangement has been made under the terms of which this company can acquire at any time, upon demand, the title to and possession of the property in the City of Detroit desired for the location of a proposed new passenger station, and a satisfactory ordi-

5,000.00

1,500,000.00 1,505,000.00

34,525,000.00

7,634,000.00

42,159,000.00

nance passed by the City providing for the necessary closing of streets and construction of subways, etc., has been accepted by this company.

On November 10, the Board of Directors approved a plan, to take effect January 1, 1910, for the retirement and pensioning of employees of the company who, through age or disability, become unable to continue longer in its service. A Board of Pensions, consisting of eight persons to be appointed annually by the President of the company, was established, and the sum of \$56,000.00, or such smaller amount as may be necessary, was authorized to be appropriated annually for the payment of pensions. The plan provides that all employees who reach the age of seventy years shall be retired, and that such of them as have been in the service for at least ten years immediately preceding their retirement shall be pensioned. Those employees who, having been in the service continually for twenty years, become, in the opinion of the Board of Pensions, unfit for duty, may be retired and pensioned.

SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1909.	1908.	Increase or decrease.
OPERATING INCOME.	1,746.46	1,746.46	
RAIL OPERATIONS.....	<i>miles operated.</i>	<i>miles operated.</i>	
Revenues	\$27,415,467.20	\$24,222,139.20	\$3,193,328.00
Expenses	18,499,528.24	16,783,767.94	1,715,760.30

NET REVENUE FROM RAIL OPERATIONS	\$8,915,938.96	\$7,438,371.26	\$1,477,567.70
Percentage of expenses to revenue	(67.48%)	(69.29%)	(1.81%)

OUTSIDE OPERATIONS.			
Revenues	\$489,927.04	\$473,281.68	\$16,645.36
Expenses	541,079.10	492,314.52	48,764.58

NET DEFICIT FROM OUTSIDE OPERATIONS	\$51,152.06	\$19,032.84	\$32,119.22
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NET REVENUE FROM ALL OPERATIONS	\$8,864,786.90	\$7,419,338.42	\$1,445,448.48
TAXES ACCRUED	1,121,531.99	1,105,694.21	15,837.78

OPERATING INCOME	\$7,743,254.91	\$6,313,644.21	\$1,429,610.70
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OTHER INCOME.			
Joint facilities rents.....	\$185,157.79	\$185,019.56	\$138.23
Miscellaneous rents	3,011.19	3,138.59	127.40
Dividends on stocks owned or controlled	248,153.85	239,066.50	9,087.35
Interest on funded debt owned	33,760.00	23,498.89	10,261.11
Interest on other securities, loans and accounts.....	471,397.82	392,795.38	78,602.44
Miscellaneous income.....	.....	.....	.....
TOTAL OTHER INCOME...	\$941,480.65	\$843,518.92	\$97,961.73

GROSS CORPORATE INCOME	\$8,684,735.56	\$7,157,163.13	\$1,527,572.43
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DEDUCTIONS FROM GROSS CORPORATE INCOME.			
Rentals of leased lines....	\$510,310.00	\$510,310.00

Hire of equipment:			
Car mileage and per diem balances	714,640.99	803,909.87	\$89,268.88
Interest on equipment trust certificates	180,127.61	214,402.05	\$34,274.44
Joint facilities rents.....	516,400.76	488,738.99	27,661.77
Miscellaneous rents	5,959.84	6,712.07	752.23
Interest on funded debt...	2,451,584.32	2,268,938.33	182,645.99
Other interest	747,290.52	841,896.40	94,605.88
Additions and betterments.....	.....	395,135.27	395,135.27
Additional equipment	548,924.72	.....	548,924.72
Other deductions	137,000.00	.....	137,000.00

TOTAL DEDUCTIONS FROM GROSS CORPORATE INCOME	\$5,812,238.76	\$5,530,042.98	\$282,195.78
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NET CORPORATE INCOME.	\$2,872,496.80	\$1,627,120.15	\$1,245,376.65
DIVIDENDS, two, aggregating 6%	1,124,280.00	1,124,280.00

SURPLUS	\$1,748,216.80	\$502,840.15	\$1,245,376.65
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Surplus for the year.....	\$1,748,216.80
Amount to credit of Profit and Loss December 31, 1908...	8,741,014.06

\$10,489,230.86

Deduct:			
Discount and Commission on Gold Debentures.	\$553,445.00		
Less—adjustment of sundry accounts.....	30,192.42		

523,252.58

Balance to credit of Profit and Loss December 31, 1909..	\$9,965,978.28
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The total operating revenues were \$27,415,467.20, an increase of \$3,193,328, as compared with the previous year.

NOTE.—Decreases in *italics*.

The freight revenue was \$18,267,530.44, an increase of \$2,240,771.25. This was due to an increased movement in nearly all commodities.

The passenger revenue was \$6,655,698.85, an increase of \$625,279.59, due to a general improvement in both local and interline business.

The express revenue was \$1,244,745.14, an increase of \$204,082.11.

Revenue from transportation of mails was \$409,212.23, a decrease of \$4,328.60.

The operating revenue from all other sources increased \$127,523.65 over the previous year.

The total expenses of operation were \$18,409,528.24, an increase of \$1,715,760.30.

Maintenance of way and structures increased \$676,351.40, due to additional expenditures for repairs to roadway, track and buildings.

Maintenance of equipment increased \$747,438.75, on account of extensive repairs to locomotives and cars of all classes.

Traffic expenses increased \$83,667.05.

Transportation expenses increased \$206,165.49, due to the heavier volume of traffic handled.

General expenses increased \$2,137.61.

There was an increase in the deficit from outside operations of \$32,119.22 over the previous year, due principally to additional expenditures in the operation of dining car service and stock yards.

The operating income was \$7,743,254.91, an increase of \$1,429,610.70. Other income was \$941,480.65, an increase of \$97,961.73, on account of additional amount received from interest on loans.

Total deductions from income amounted to \$5,812,238.76, an increase of \$282,195.78, due principally to interest on gold debentures issued, charges for additional equipment and proportionate share of deficit from operation of Indiana Harbor Belt Railroad, partially offset by decreased charges for hire of equipment, general interest and additions and betterments.

The profit from operation for the year, after payment of 6% in dividends upon the capital stock, was \$1,748,216.80, which has been carried to the credit of Profit and Loss.

The following appointments of officials were made during the year:

January 1, Herbert D. Howe, General Land & Tax Agent.

January 1, Ora E. Butterfield, Assistant General Solicitor.

April 1, Nathaniel E. Slaymaker, Land Tax Agent.

April 1, William Hutchinson, Assistant Land & Tax Agent.

August 2, James J. Ross, Superintendent of Telegraph.

October 1, Henry Shearer, Division Superintendent, St. Thomas.

November 1, N. Bates Ackley, Assistant Auditor.

November 1, Eugene A. Wigren, Auditor of Disbursements.

November 1, John M. Edson, Freight Claim Agent.

November 1, William C. Lewis, Assistant General Freight Agent, Chicago.

November 1, Joseph H. Brown, Assistant General Freight Agent, Bay City.

December 1, Frank E. Robson, General Attorney.

December 1, John P. Puhl, Paymaster.

General conditions were never more favorable, and every visible indication points to renewed and increasing prosperity for the country at large, in which the railroads may hope to participate.

The business of the road shows steady increase; and expenditures which have been made for improvements, adding to efficiency and economy of operation, should be reflected in increased net revenue.

Appreciative acknowledgement is made of the faithful, efficient performance of duty by employees in every department of the service during the year.

WILLIAM C. BROWN,
President.

CAPITALIZATION.

Capital Stock.

Number of shares issued and outstanding.....	187,380
Number of shares authorized.....	187,380
Par value per share.....	\$100.00
Total par value issued and outstanding.....	\$18,738,000.00
Total par value authorized.....	\$18,738,000.00
Amount of capital stock per mile of road owned (270.07 miles)	\$69,382.00

Amount of funded debt per mile of road.

Road	Funded debt.	Miles.	Amount per mile of road.
Michigan Central Railroad.....	\$31,634,000	270.07	\$117,132
Detroit & Bay City Railroad.....	4,000,000	171.34	23,345
Kalamazoo & South Haven Railroad.....	700,000	39.50	17,722
Michigan Air Line Railroad.....	2,600,000	115.16	22,577
Jackson, Lansing & Saginaw Railroad.....	1,725,000	379.23	4,562
Joliet and Northern Indiana Railroad.....	1,500,000	45.00	6,667
	\$42,159,000	1,020.30	\$41,320

DIVIDENDS.

Payable July 29, 1909, 3% on 187,380 shares of capital stock	\$562,140.00
Payable January 20, 1910, 3% on 187,380 shares of capital stock	\$562,140.00

Total

6%

\$1,124,280.00

CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1909.

Assets.	
Property owned as investment: Total cost of road and equipment	\$53,582,279.75
Securities owned	7,759,191.50
Investments	3,180,820.77
Total property owned as investment	64,522,292.02
Working assets	10,964,851.77
Deferred debit items	7,900,099.19
Total	\$83,387,242.98
Liabilities.	
Capital stock, common	\$18,738,000.00
Funded debt:	
Mortgage Bonds:	
Michigan Central first mortgage....	\$14,000,000.00
Detroit & Bay City first mortgage..	4,000,000.00

Kalamazoo & South Haven first mortgage	\$700,000.00
Michigan Air Line first mortgage..	2,600,000.00
Jackson, Lansing & Saginaw first mortgage	1,725,000.00
Joliet & Northern Indiana first mortgage	1,500,000.00
Plain bonds, debentures and notes:	
Gold debentures	7,634,000.00
Three-year 5% gold notes.	10,000,000.00
Total capitalization	\$60,897,000.00
Working liabilities	\$9,363,507.45
Accrued liabilities not due	642,202.05
Deferred credit items	337,008.34
Surplus: Additions to property through income since June 30, 1907	2,181,546.86
Profit and loss: Surplus	9,965,978.28
Total	\$83,387,242.98

TWENTY-FIRST ANNUAL REPORT, CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY CO.: FOR THE YEAR ENDED DECEMBER 31, 1909.

To the stockholders of

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY COMPANY:
The Board of Directors herewith submits its report for the year ended December 31, 1909.

The statements showing operations, revenues and expenses in detail, etc., are prepared in accordance with the recent classifications of the Interstate Commerce Commission.

The mileage embraced in the operation of the road is as follows:

Main line	1,680.95
Branches	166.64
Trackage rights	134.62
Total length of road operated.....	1,982.21
Second track	338.63
Side tracks	1,084.27
Total mileage of track.....	3,405.11

The total mileage of track operated has been increased during the year as follows:

Side tracks—increased.....	23.23
Main line—decreased .....	.02
Total additional tracks.....	23.21

The following is a statement of the capital stock authorized and outstanding on December 31, 1909:

Preferred stock authorized..... \$10,000,000.00

Common stock authorized..... 50,000,000,00

Total preferred and common stock authorized..... \$60,000,000.00

Preferred stock issued and outstanding... \$10,000,000.00

Common stock issued and outstanding... 47,056,300.00

57,056,300.00

Balance common stock authorized, but not issued December 31, 1909..... \$2,943,700.00

The funded debt outstanding December 31, 1908, was... \$65,183,730.00

During the year there were issued

C. C. C. & St. L. Ry. general mortgage bonds

For retirement of prior lien bonds..... 79,000.00

\$65,104,730.00

The prior lien bonds retired during the year were as follows:

C. I. St. L. & C. Ry. Co. first mortgage 6 per cent. bonds \$6,000.00 |

C. I. St. L. & C. Ry. Co. general first mortgage 4 per cent. bonds..... 73,000.00

79,000.00

Total funded debt outstanding December 31, 1909... \$65,183,730.00

There was expended during the year for additions to the property, improvements, double tracking, equipment, etc., and charged to cost of road and equipment, the sum of \$944,906.32, as follows:

Cleveland Division..... \$141,176.16

Cincinnati Division..... 142,888.32

St. Louis Division..... 151,226.64

Chicago Division..... 171,520.49

Cairo Division..... 135,525.95

Michigan Division..... 13,355.69

Interest during construction, Cincinnati and Chicago divisions 26,254.78

For new equipment..... 162,958.29

Total..... \$944,906.32

A detailed statement of the above will be found upon another page. There has been advanced on account of the St. Louis Short Line Division during the year, for construction, \$30,276.20.

The accumulated charges for advances to the Central Indiana Railway Company for deficit on account of operation to December 31, 1908, amounting to \$635,081.72, have been regarded as uncollectible and have been written off against Profit and Loss. This company's proportion of the deficit in operation of that road for the year 1909, amounting to \$52,640.92, has been charged off as a "Deduction from Income."

The Evansville, Mt. Carmel & Northern Railway Company was organized under the laws of the State of Indiana, August 1, 1906, and under the laws of the State of Illinois, November 7, 1906, to construct a railroad from Harrisburg, Saline County, Illinois, to Marion, Williamson County, Illinois. There has been advanced on account of this property, during the year, \$1,546.31.

The Saline Valley Railway Company was organized under the laws of the State of Illinois, April 6, 1907, for the purpose of constructing a railroad from Harrisburg, Saline County, Illinois, to Marion, Williamson County, Illinois. There has been advanced on account of this property, during the year, \$1,546.31.

There have been purchased during the year by the Central Trust Company, Trustee for the C. C. C. & St. L. Ry. Company's St. Louis Division first collateral trust mortgage bonds, 22 bonds, par value \$22,000.00, making a total of 542 bonds at par value of \$542,000.00, now held by the Central Trust Company, Trustee.

During the year there was expended for new equipment, including instalments on account of the New York Central Lines Trust of 1907, the sum of \$832,029.90, of which \$669,071.61 was charged to replacement fund and \$162,958.29 to capital account.

Full particulars regarding the equipment acquired and rental paid under the terms of the New York Central Lines Equipment Trust Agreement and Lease of 1907 will be found on another page.

SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1909.	1908.	Increase or Decrease.
OPERATING INCOME. RAIL OPERATIONS.	1,982.21 miles operated.	1,982.23 miles operated.	.02 miles.
Revenues	\$27,657,740.99	\$24,242,616.75	\$3,415,124.24
Expenses	19,711,494.56	18,333,450.53	1,378,044.03

NET REVENUE FROM RAIL OPERATIONS	\$7,946,246.43	\$5,909,166.22	\$2,037,080.21
Per ct., expenses to revenue	(71.27%)	(75.62%)	(4.35%)

OUTSIDE OPERATIONS.			
Revenues	\$305,324.92	\$286,661.79	\$18,663.13
Expenses	361,863.38	304,135.84	57,727.54

NET DEFICIT FROM OUTSIDE OPERATIONS.....	\$56,538.46	\$17,474.05	\$39,064.41
NET REVENUE FROM ALL OPERATIONS	\$7,889,707.97	\$5,891,692.17	\$1,998,015.80

TAXES ACCRUED	878,328.26	829,008.13	49,320.13
OPERATING INCOME	\$7,011,379.71	\$5,062,684.04	\$1,948,695.67

OTHER INCOME.			
Joint facilities rents	\$309,155.40	\$290,920.24	\$18,235.16
Miscellaneous rents	132,489.89	125,699.65	6,790.24
Dividends on stocks owned or controlled	98,274.90	57,332.90	40,942.00
Interest on funded debt owned	44,260.00	43,420.00	840.00
Interest on other securities, loans and accounts	36,177.43	36,652.73	475.30
Miscellaneous income	2,875.25	.....	2,875.25
TOTAL OTHER INCOME....	\$623,232.87	\$554,025.52	\$69,207.35

GROSS CORPORATE INCOME	\$7,634,612.58	\$5,616,709.56	\$2,017,903.02
DEDUCTIONS FROM GROSS CORPORATE INCOME.			

Rentals of leased lines.....	\$120,000.00	\$120,000.00	.....
Hire of equipment, car mileage and per diem balances	482,156.54	717,437.05	\$235,280.51
Interest on equipment trust certificates	170,627.10	176,617.97	5,990.87
Joint facilities rents.....	499,006.81	428,470.62	70,536.19
Miscellaneous rents.....	142,109.70	143,481.90	1,372.20
Interest on funded debt...	2,925,848.00	2,910,935.67	14,912.33
Other interest	465,851.70	410,987.65	54,864.05
Proportion loss operation Central Indiana Ry.	52,640.92	.....	52,640.92

TOTAL DEDUCTION FROM GROSS CORPORATE INCOME	\$4,858,240.77	\$4,907,930.86	\$49,690.09
NET CORPORATE INCOME..	\$2,776,371.81	\$708,778.70	\$2,067,593.11

Dividends preferred four, aggregating 5 per cent.	\$500,000.00	\$500,000.00	.....
Dividends common, one, 2 per cent.	941,126.00	.....	\$941,126.00

	\$1,441,126.00	\$500,000.00	\$941,126.00
SURPLUS FOR THE YEAR..	\$1,335,245.81	\$208,778.70	\$1,126,467.11

Amount to credit of profit and loss December 31, 1908...	\$2,078,460.85
Surplus for the year 1909.	1,335,245.81

NOTE.—Decreases in *italics*.

	1909.	1908.	Increase or decrease.
Add:			
Profit on sale of 30,000 shares of stock in the Chesapeake & Ohio Ry. Co.	\$814,291.08		
Adjustment of sundry accounts	21,026.39		835,317.47
Deduct:			\$4,249,024.13
Advances to the Central Indiana Ry. for loss in operating to December 31, 1908	\$635,081.72		
For defalcation of Local Treasurer, Cincinnati, Ohio	591,989.19		1,227,070.91

BALANCE DECEMBER 31, 1909..... \$3,021,953.22
The operating revenues were \$27,657,740.99, an increase of \$3,415,124.24.

The freight revenue was \$17,975,352.63, an increase of \$2,724,991.90. The local earnings show an increase of 11% and the interline an increase of 22%.

The passenger revenue was \$7,169,670.05, an increase of \$527,597.75. The local earnings show an increase of 5% and the interline an increase of 10%.

The mail revenue was \$729,272.38, an increase of \$13,009.29.

The express revenue was \$784,675.96, an increase of \$26,822.10.

Other transportation revenue was \$743,222.52, an increase of \$80,165.11, due chiefly to increased revenue from switching.

Revenue from operations other than transportation was \$255,547.45, an increase of \$42,535.09, due chiefly to increased car service and revenue from joint facilities.

The expenses of operation were \$19,711,494.56, an increase of \$1,378,044.03.

Maintenance of way and structures showed an increase of \$341,967.98.

Maintenance of equipment showed an increase of \$804,185.79, of which \$248,900.64 was in renewals and \$555,285.15 in repairs to all classes of equipment.

Traffic expenses increased \$89,246.74.

Conducting transportation showed an increase of \$126,800.45. The principal fluctuations were as follows:

Fuel for locomotives increased \$68,158.59.

Engine and roundhouse men, train service and supplies increased \$216,236.23.

Station yard, telegraph service and supplies increased \$101,733.33.

Loss and damage decreased \$203,404.91.

Injuries to persons decreased \$60,844.89.

General expenses increased \$15,843.07.

The net operating revenue was \$7,946,246.43, an increase of \$2,037,080.21.

The net deficit from outside operations was \$56,538.46, an increased net loss of \$39,064.41.

Taxes increased \$49,320.13.

Other income was \$623,232.87, an increase of \$69,207.35, due principally to increased rental received from joint operations and other property and increased interest and dividends from securities.

Deductions from income were \$4,858,240.77, a net decrease of \$49,690.09.

The principal fluctuations consisted of increased interest on funded debt \$14,912.33; increased interest on loans \$54,864.05; increased rentals paid account joint facilities \$70,536.19; proportion operating loss of Central Indiana Railway Company \$52,640.92; and decrease in hire of equipment \$235,280.51; due to larger earnings from per diem mileage.

The net income for the year, after paying all charges, was \$2,776,371.81, out of which was paid a dividend of 5% on preferred stock, and 2% on the common stock, leaving a surplus for the year of \$1,335,245.81.

On the pages following will be found the general balance sheets and tabulated statements showing results of operation for the year.

Separate reports have been issued showing the financial condition and results from operation of the Peoria & Eastern Railway and the Cincinnati Northern Railroad for the year.

The operation of the Kankakee and Seneca Railroad (for which separate accounts are kept) shows earnings for the year \$76,001.86, operating expenses and taxes \$92,591.47, deficit \$16,589.61.

The Mt. Gilead Short Line (for which separate accounts are kept) shows earnings for the year \$5,918.39 operating expenses and taxes \$8,546.38, deficit \$2,627.99.

On November 24th the Board of Directors approved a plan, to take effect January 1, 1910, for the retirement and pensioning of employees of the company who, through age or disability, become unable to continue longer in its service. A Board of Pensions, consisting of eight persons to be appointed annually by the President of the company, was established and the sum of \$70,000.00, or such smaller amount as may be necessary, was authorized to be appropriated annually for the payment of pensions. The plan provides that all employees who reach the age of seventy years shall be retired, and that such of them as have been in the service for at least ten years

On November 1, 1909, Mr. Edward P. Higgins was appointed assistant auditor.

On November 8, 1909, Mr. Rush N. Harry was appointed local treasurer.

General conditions were never more favorable, and every visible indication points to renewed and increasing prosperity for the country at large, in which the railroads may hope to participate.

The business of the road shows steady increase; and expenditures which have been made for improvements, adding to efficiency and economy of operation, should be reflected in increased net revenue.

Appreciative acknowledgment is made of the faithful, efficient performance of duty by employees in every department of the service during the year.

WILLIAM C. BROWN,
President.

First Charges.

Interest on bonds.....	\$2,925,848.00
Rentals of leased lines—C. I. & St. L. Short Line Railway	120,000.00
Hire of equipment—car mileage and per diem balances.....	482,156.54
Interest on equipment trust certificates.....	170,627.10
Joint facilities rents.....	499,006.81
Miscellaneous rents.....	142,109.70
Interest on loans, notes and bills payable.....	465,851.70
Proportion operating loss—Central Indiana Railway.....	52,640.92
Taxes on real estate.....	791,594.93
Taxes on gross earnings—State of Ohio.....	85,690.08
Railroad commissioners' assessments—State of Ohio.....	1,043.30
Total first charges and taxes.....	\$5,736,569.03

CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1909.

Assets.	
Road and equipment to June 30, 1907.....	\$114,393,891.04
Road and equipment since June 30, 1907.....	12,283,500.51
Total	\$126,677,391.55
Securities owned	\$1,966,078.00
Other permanent investments	1,061,711.84
Total capital assets.....	\$129,705,181.39

Working assets:	
Cash	\$2,630,692.88
Marketable securities	241,555.00
Loans and bills receivable.....	80,541.60
Net traffic, car mileage and per diem balance.....	725,471.20
Net balance due from agents and conductors.....	771,045.43
Miscellaneous accounts receivable.....	1,654,642.69
Materials and supplies.....	1,149,171.23
Total working assets	\$7,253,120.03
Deferred debit items.....	2,807,816.04
Total assets	\$139,765,617.46

CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1909.

Stock:	
Capital Stock:	
Common stock	\$47,056,300.00
Preferred stock	10,000,000.00
Cincinnati, Sandusky & Cleveland preferred stock and scrip.....	428,997.45
Stock liability for conversion of outstanding securities of constituent companies	10,821.01
	\$57,496,118.46

Mortgage, bonded and secured debt:	
Funded debt:	
Mortgage bonds	\$55,183,730.00
Collateral trust bonds	10,000,000.00
Plain bonds, debentures and notes	5,003,425.00
	70,187,155.00
Working liabilities:	
Loans and bills payable	\$3,000,000.00
Audited vouchers and wages unpaid	3,707,353.08
Miscellaneous accounts payable	6,690.31
Matured dividends, interest and rents unpaid	473,627.37
Working advances due to other companies	74,260.48
Other working liabilities	10,997.04
	7,272,928.28
Accrued liabilities not due	1,785,202.06
Deferred credit items	2,260.44
Profit and loss—Surplus	3,021,953.22
Total liabilities	\$139,765,617.46

NEW YORK CENTRAL LINES EQUIPMENT TRUST OF 1907.

The following statement shows the character of the equipment acquired under the terms of the New York Central Lines Equipment Trust Agreement and Lease of 1907, together with the total amount of certificates issued by the Guaranty Trust Company, and the amount now outstanding:

	Certificates issued by Guaranty Trust Co.	Rental paid and applied to redemption of certificates.	Balance by Guaranty Trust Co. outstanding Dec. 31, 1909.
Road.			
N. Y. C. & H. R. R. Co.	447	88	4,000
L. S. & M. S. Ry. Co.	125	25	200
C. I. & S. R. R. Co.	2	8	3,400
M. C. R. R. Co.	5	15	3,500
C. C. C. & St. L. Ry. Co.	112	17	1,525
TOTALS	691	153	16,425
	650	\$30,000,000.00	\$4,000,000.00
			\$26,000,000.00

Immediately preceding their retirement shall be pensioned. Those employees who, having been in the service continuously for twenty years, become, in the opinion of the Board of Pensions, unfit for duty, may be retired and pensioned.

The following changes in organization occurred during the year:

On January 27, 1909, Mr. W. C. Brown was elected president.

On January 1, 1909, Mr. George P. Smith was appointed Chief Engineer.

On January 1, 1909, Mr. Herbert D. Howe was appointed general land and tax agent.

On June 15, 1909, Mr. Joseph Moses was appointed assistant general land and tax agent.

In addition to the annual rental payment of one-fifteenth of the par value of the certificates originally issued, the further sum of \$1,400,000, representing interest at the rate of 5 per cent. per annum on \$28,000,000 of certificates, was paid in 1909 by the companies, parties to the agreement, as follows:

New York Central & Hudson River Railroad Company	\$555,562.08
Lake Shore & Michigan Southern Railway Company	313,058.34
Chicago, Indiana & Southern Railroad Company	176,398.90
Michigan Central Railroad Company	182,297.82
Cleveland, Cincinnati, Chicago & St. Louis Railway Co.	172,682.86

TOTAL

\$1,400,000.00